

Project document

Information and Communication Technology (ICT) for development of small and medium-sized exporters in Latin America: Chile

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IDE-JETRO

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Abstract

Chile has a reputation as a country with an open economy and sound macroeconomic fundamentals. Over the years, its well-coordinated economic policy has attracted foreign direct investment (FDI), which has encouraged the development of export sectors and facilitated the dissemination of information technologies (ITs) nationwide. Today, Chile's per-capita distribution rates for IT products and services are the highest in Latin America.

Nonetheless wide gaps remain between large firms and small and medium-sized enterprises (SMEs) in terms of IT exports and usage. From an international standpoint, IT penetration among Chilean society and businesses is not high compared to developed countries; and it is unclear whether Chile has significant advantages in IT usage compared to developing countries in Asia where some firms are integrated in international supply chains based on IT management systems. Chile's IT sector is also less developed than several ASEAN States and Latin American countries such as Brazil.

There are three key policy issues for Chile that arise from innovations in IT, globalization, and Chile's trade policy that seeks to benefit from free trade agreements (FTAs) (El Mercurio 2005a). The first is to seize new opportunities for traditional businesses that will benefit from using effectively IT methods, such as e-commerce. The second is to improve the competitiveness of export goods and services in order to survive intensifying international competition. Key issues for firms will be to increase value-added in the existing range of products and services, to develop new ones, and to reduce costs. This will be reached by ITs that will achieve higher quality and more effective business management, effective R&D activities and others that should improve overall business activities. The third is development of the IT sector itself.

These issues bear more heavily on SMEs than on larger firms, and ITs should also open up broader fields of business activities for SMEs. The public and academic sectors should also be required to make efforts to improve the competitiveness of Chilean firms, especially through technology transfers from universities to the corporate sector.

This report explores intra- and inter-regional cooperation in Asia and Latin America to promote international trade by SMEs, based on Chilean experiences of government policies to promote IT usage by developing small and medium-sized exporters, and of international cooperation in the IT field.

I. The current situation in the IT market and IT use by SMEs

Chile is the most digitized economy in South America. Dissemination rates for IT products and services in Chile have risen to the highest level in Latin America, although it has a smaller market and fewer users than the region's largest countries such as Argentina, Brazil and Mexico. There are indicators that support the view that Chile provides one of the best IT environments in Latin America as a market and as an IT business base. At the same time, the data reveal a gap between Chile and countries in Asia that are making progress in developing IT uses and IT-related industries.

A. Market estimates

Statistics on the IT market are not available from the official data sources of official organizations. Estimated figures are published by private research firms such as International Data Corporation (IDC) and business organizations. The exception is telecom-related data, which are produced by the Under-secretariat for Telecommunications (*Subsecretaría de Telecomunicaciones* (SUBTEL)). Most of the data are published occasionally, and methodologies among the research agencies are not necessarily coordinated.

1. Overview of the digital economy

According to a survey conducted by the National Chamber of Commerce, Services and Tourism (Cámara Nacional de Comercio (CNC)) and IDC Chile, total IT investment in Chile was estimated at US\$ 1,158 million in 2000, consisting of hardware (US\$ 644.0 million and 55.6% of the total), software packages (US\$ 118.8 million, 10.3%) and services (US\$ 395.0 million, 34.1%). This estimated value was less than the equivalent figure in Venezuela. On the other hand, per-capita expenditure in Chile was the third highest in Latin America in 2000, estimated at US\$ 76.2 and above the figure for Mexico.

Information technology investments in Chile are not growing vigorously however; and, apart from package software, the figures have been trending down since 2000. IT investments in Chile represented 1.65% of GDP in 2000, which was higher than in Argentina (1.25%) and

Mexico (1.00%), but lower than in Brazil (2.35%) and Colombia (1.79%) (IDC-Chile and CNC, July 2002). In 2003 the figure for Chile was 1.4%, compared to 2.7% in Hungary, 2.6% in the Czech Republic, and 2.1% in Japan.

TABLE 1
IT INVESTMENTS IN CHILE
(In millions of US\$)

	2000	2001	2002	2003	2004 ^a
Hardware	644.0	638.2	552.0	491.5	496.6
Package Software	118.8	123.8	127.7	134.2	142.9
Services	395.0	365.1	384.6	403.8	429.9
Total IT Investment	1 158.0	1 127.1	1 064.3	1 029.5	1 069.5

Source: IDC Chile and CNC (September 2004), < <http://www.cnc.cl/>> (Estudios CNC–Informes–Comercio Electrónico).

^a Estimated.

More recent estimates can be obtained from the Cámara de Comercio de Santiago (CCS, 2003b), although these are not comparable to the CNC-IDC data. According to this report, the IT market amounted to US\$ 8.5 billion in 2003, equivalent to 12% of the GDP, with annual growth of 27%. This market estimate encompassed infrastructure such as hardware (US\$ 1.0 billion, 12% of the total); telecommunications encompassing local and long distance phone calls, and mobile and data communications (US\$ 2.7 billion, 32%), software and applications (US\$ 180 million, 2%), services including e-payment, digital signature, and hardware and software maintenance (US\$ 700 million, 9%), and e-commerce (US\$ 3,800 million, 47%).

2. Hardware

According to a CNC-IDC survey (April 2003), a total of 299,094 PC units were sold in Chile in 1999, 429,177 in 2000, 425,866 in 2001, and 393,726 in 2002. By market segment, the largest purchaser was the business enterprise sector, which bought 240,498 units or 61.1% of the total in 2002. Households were the second largest buyers (113,484 units, 28.8%), followed by the government sector (20,153 units, 5.1%) and education (19,589 units, 5.0%).

This survey also considered the total number of PCs sold in Latin America, which were distributed as follows: business (47.6%), households (39.6%), Government (9.7%), and education (3.1%). Compared to the situation in the overall Latin American market, the key features of the PC market in Chile are the large shares of the business and educational sectors.

The same pattern can be seen in the LAN server market, defined as multi-user equipment priced under US\$ 25,000. A total of 5,631 server units were sold in Chile in 2002, with the business sector buying 4,995 units or 88.7% of the total, and the remainder being shared between the Government (322 units, 5.7% of the total) and the education sector (314 units, 5.6%). In 2002, the LAN server market in Latin America as a whole amounted to 115,229 units, 82.1% of which were purchased by enterprises. The Government and education sectors accounted for 13.7% and 4.2% respectively.

The education sector's large share reflects the high priority placed by the Government of Chile on enhancing the computer environment in schools, implemented in practice through the Enlaces network in primary and secondary schools, which was inaugurated in 1992. As a result of large investments in this network, the number of students per computer dropped from 67.3 in

1999 to 50.5 in 2003, and Enlaces became the most widespread network in Chile. It now covers 80% of all schools; and over 70% of the teachers have been trained in IT use. Starting in August 2002 Enlaces began to make computer rooms available to local communities in more than 500 schools, in order to train citizens through the Government's Digital Literacy campaign.

These community “infocentres” would be useful for households especially in the rural area. According to the 2002 Census, 20.5% of all households owned PCs and 10.2% of them had access to the Internet, whereas the equivalent penetration ratios in the rural area were just 5.1% and 1.8%.

3. Enterprise resource management (ERM) and customer relationship management (CRM) software

Enterprise resource management integrates firms' internal management divisions, such as human resources, finance, accounting and project management, in order to optimize resource use. Customer relationship management is a solution enabling firms to automate resource management in the field of sales, marketing, and client service. These are key applications for firms to improve their productivity. Sales of ERM and CRM software in Chile have been expanding since 2002, with growth outpacing that of Latin America as a whole.

TABLE 2
SALES OF ERM AND CRM SOFTWARE IN LATIN AMERICA AND CHILE
(In millions of US\$ and percentages)

	Latin America				Chile			
	ERM		CRM		ERM		CRM	
	Sales	Growth (%)	Sales	Growth (%)	Sales	Growth (%)	Sales	Growth (%)
2002	373 900		75 200		23 400		6 792	
2003	384 900	2.9	86 400	14.9	31 600	35.0	8 600	26.6
2004 ^a	411 800	7.0	99 000	14.6	35 600	12.7	11 000	27.9

Source: IDC Chile and CNC (September 2004), < <http://www.cnc.cl/>> (Estudios CNC–Informes–Comercio Electrónico).

^a Estimated.

4. Telecommunication services

The telecommunication sector developed very rapidly during the 1990s. Market liberalization encouraged local and foreign telecom firms to invest in the sector, and annual investment levels grew from US\$ 370 million in 1990 to US\$ 1,118 million in 2000. Following the boom the level dropped back to US\$ 610 million in 2002.

The structure of the sector has been transformed by the advent of the Internet and rapid spread of the mobile phone. In 1998, the total sales of the sector were about US\$ 1,256 million, 83% of which came from fixed phone services. In 2002, 41% of total sales (about US\$ 2,539 million) were derived from the mobile phone, while Internet transactions accounted for 5.8% of total sales. The share of fixed phone services dropped to 43% (CCS, 2003b).

In 2002, 51.5% of households subscribed to fixed telephony services, and 51.0% had a mobile phone. The penetration rate for mobile phones is higher than for fixed phone services except in the V, XII, and Metropolitan regions. Mobile telephony is currently the most popular voice service in Chile (SUBTEL), with 42.83 subscribers per 100 habitants in 2002—the same as Canada's 41.68 in 2003 (International Telecommunication Union, ITU).

Although Internet access from mobile phones is less popular than in advanced Asian countries such as Japan and the Republic of Korea, in October 2003 Telefónica Móvil launched high-speed data transmission service based on Enhanced Data Rates for GSM Evolution (EDGE), making it possible to exchange data at a speed of 474Kbps through the existing GSM (Global System for Mobile Communications) network. Data transmission speeds using EDGE are as fast as the broadband connection popular among Chilean households. Chile is the first country in Latin America and the fourth in the world, following Hong Kong (China), Finland and the United States to introduce EDGE. Telefónica introduced this service in Santiago and the V Region; and the network encompassed 27 cities as of July 2004 (Telefónica Móvil).

5. Internet

According to ITU data, the number of the Internet users in Chile grew strongly in the late 1990s, rising from 250,000 in 1998, to 625,000 in 1999 and 2,537,308 by 2000. Since then, the number of users has continued to rise, reaching levels of 3,102,200 in 2001 and 3,575,000 in 2002. The recent slower expansion is shown by the indicator on Internet users per 100 people, which shot up from 4.16 in 1999 to 16.68 in 2000, before rising more slowly to 20.14 in 2001 and 23.75 in 2002.

While the growth rate of Internet subscribers is slowing down, dial-up Internet connections are being replaced by dedicated lines such as the Asymmetric Digital Subscriber Line (ADSL), Cable Modem and the Wireless Local Loop (WLL), or the Fixed Wireless Access (FWA). According to SUBTEL, the share of dedicated connections grew from 0.5% in June 2000 to 27.8% in March 2003.

A March 2004 study by IDC Chile showed that the number of the broadband connections, defined as connections with a transmission speed of at least 128Kbps, increased from 186,273 in December 2002, to 312,932 in December 2003 and 322,445 in March 2004. Among the various transmission methods, the most popular are ADSL, WLL and Cable Modem, which jointly account for 98% of all broadband connections (ADSL+WLL: 49.8%, Cable Modem: 48.3%). Although broadband is becoming popular, 83.4% of connections make data transmission at a maximum speed of 256-512Kbps, which would be considered “narrowband” by users in advanced countries.

6. E-commerce and e-banking

E-commerce is not well established among economic activities in Chile, although transactions are growing rapidly. CCS (2003b) estimated that the total volume of e-commerce (measurements for transactions carried out through digital media by traditional sectors such as mining, manufacturing and construction) grew from US\$ 341 million in 2000 to US\$ 1,445 million in 2001, and had reached US\$ 2,329 million by 2002.

The business to consumer (B2C) segment of e-commerce accounted for under 2% of total e-commerce transactions or US\$ 40 million in 2002, although this was double the 2000 figure. The ratio of B2C to total transactions was 0.2% and expected to remain at 0.5% in 2005. Although B2C is starting to be used for ticket sales, the unexpectedly slow market growth resulted in some firms abandoning the system, thereby causing market concentration among the larger firms. The number of online stores fell from roughly 190 in mid-2002 to about 160 in the middle of 2003.

The most promising e-commerce segment is business to business (B2B). Total B2B transaction values were estimated at US\$ 321 million in 2000, US\$ 1,415 million in 2001 and US\$ 2,288 million in 2002. The share of B2B in total transactions amounted to 2.2% in 2002 and is projected to reach 7.0% by 2005. So-called “e-marketplaces” are starting to be widely used

among firms, with an estimated US\$ 2 billion e-transactions and over 20,000 suppliers offering their products through the Internet. About 65% of the country's e-marketplaces are vertical markets that focus on a specific industry such as supermarkets, or the construction or mining sectors.

The other driving force behind B2B is ChileCompra, the government e-procurement system. As of March 2004, 64,116 suppliers, or 21% of Chilean firms were registered with the system. ChileCompra and CCS forecast that B2B transactions will increase from US\$ 3,320 million in 2003 to US\$ 5,757 million in 2004, and that the ChileCompra share will rise from 5% to 23% over the same period.

Internet banking is one of the key online services that are gaining increasing numbers of users. The number of customers connected to financial systems through the Internet grew by 147.7% from 285,800 to 707,905 between 2000 and 2003. As the total number of current accounts is about 1.5 million, roughly 45% of bank customers have accesses to Internet banking systems. During the same period, the number of transactions grew exponentially by 321.4% from 6,827,651 to 28,773,624 (Chilean Association of Banks and Financial Institutions, *Asociación de Bancos e Instituciones Financieras* (ABIF)).

B. Penetration of IT and e-commerce by SMEs

As noted above, Chilean society is ready to participate in the information society. It has built one of the best telecommunications infrastructures in Latin America, and more and more citizens and workers are connected to the Internet. This observation is also broadly true of Chile's business sector.

Information on the computerization of Chilean firms can be gained from several sources. Among the most representative are the report on the digital economy and newsletters published by CCS, which provide readers with comprehensive data spanning several years. In a report announced by the Government, a survey conducted by the Undersecretary for Economic Affairs (Subsecretaría de Economía, 2002) provided a detailed description the situations of IT use for different firm sizes.

1. IT use by Chilean firms

According to CCS (2003b), Internet use by Chilean firms has been increasing. In 2000 and 2003, the proportion of firms with Internet connections grew from 42% to 69%, with website ownership rising from 7% to 25%. These rates are expected to increase further in 2004 (figure 1).

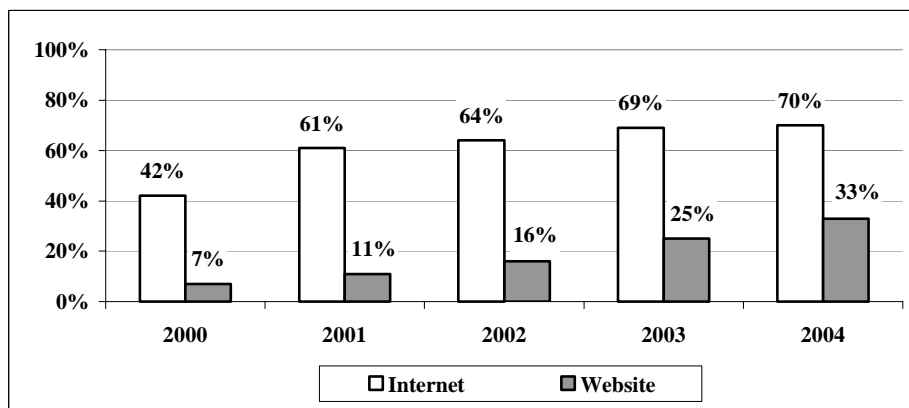
Nonetheless, in 2003 only 11% of firms used the Internet as a sales platform, and 16% for purchasing inputs and connecting with their providers, a situation likely to persist in 2004. The most widely used applications were Internet banking (58%), procedures with government agencies (53%), and tax declaration and payment (48%); less developed were sales to foreign markets (4%), videoconference (4%) and e-learning (6%).

Firms with Internet connections recognize the positive impact of IT. According to CCS (2003b), efficiency improvements were obtained in 66% of cases, and productivity increase and cost reduction were also acknowledged by 57% and 49% of Internet users respectively. Moreover, 40% of firms increased their market shares and 33% have registered an increase sale as a result of using IT tools.

However online application use is uncommon among Chilean businesses compared to the situation in OECD countries. While the adoption of online tax payment in Chile in 2003 (about

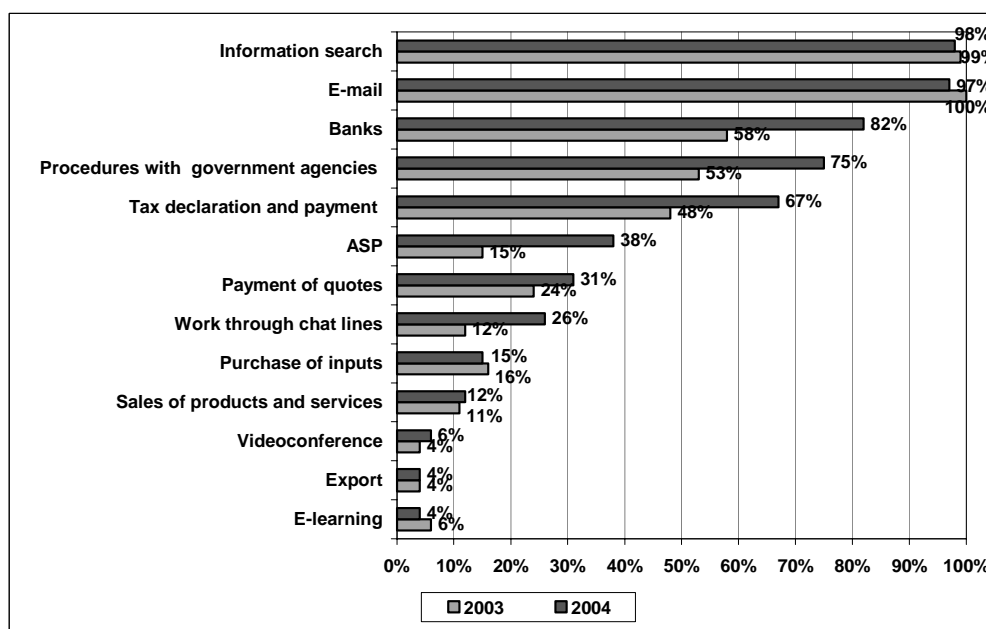
50% of firms) is much higher than in developed countries (for example, France: 18%, Japan: 2%), only 25% of them have established their own websites, compared to more than half in industrialized countries. The dissemination of e-commerce in Chile is also much lower than in OECD (e.g. Internet sales and purchases in France: 18% and 30%, Japan: 40% and 28%).

FIGURE 1
PERCENTAGE OF FIRMS WITH INTERNET CONNECTION AND WEBSITE



Source: CCS, October 18, 2004 <www.ccs.cl>

FIGURE 2
INTERNET USE BY FIRMS



Source: CCS, October 18, 2004 <www.ccs.cl>

2. IT use by SMEs

IT dissemination and use varies according to firm size; Subsecretaría de Economía (2002) provides comprehensive information on IT access and use by Chilean firms. One of the advantages of the survey conducted in March-May 2002 is that the definition of SMEs used is consistent with that applied to other SME-related statistics by government agencies under the Ministry of Economic Affairs.

The survey classified firms based on net annual sales valued in terms of the inflation-indexed currency unit Unidad de Fomento (UF). On 31 December 2003, one UF was worth 16,920 Chilean pesos (CH\$) or about US\$ 28 (1 UF = CH\$16,350 or US\$ 24 during the survey period). The classifications are as follows:

- Micro-enterprise: under 2,400 UF (US\$ 72,000)
- Small firm: from UF 2,401 to 25,000 (US\$ 72,000 to 750,000)
- Medium-sized firm: from UF 25,001 to 100,000 (US\$ 750,000 to 3 million)
- Large firms: over 100,000 UF (US\$ 3 million)

In this survey, medium-sized firms were further divided into small-medium (25,001-50,000 UF) and medium (50,000-100,000 UF). Survey respondents totalled 3,134 firms with sales of between 2,401 and 300,000 UF, including 2,584 SMEs (small: 1,136, small-medium: 805, medium: 643) but excluding micro-enterprises and large firms. In the same period, the population consisted of 79,089 firms including 76,337 SMEs (small: 66,295, small-medium: 6,476, medium: 3,566).

a) IT access and use

While 93.5% of all Chilean SMEs are connected to the phone network and 72.5% own a fax machine, only 62.7% of all SMEs are equipped with PCs and just 41.8% have Internet access from their offices. Even among firms that possess a PC, 33.3% do not have an Internet connection. SMEs without PCs can access the Internet from outside their offices, however, and in fact 5.1% of firms do so. Wide disparities in IT diffusion were noted especially among small and small-medium firms: 37% of small and 67.9% of small-medium firms had Internet access. A much smaller number had established their own websites. About half of all large firms and less than 10% of the small ones had established them.

PCs are mainly used with basic software such as word processor and spreadsheet programmes, and Internet applications such as browsers and e-mail, both of which mainly help enhance personal productivity. About 85% of SMEs with PCs used basic software of this type and over 50% used Internet browsers and e-mail. On the other hand, ITs are not fully incorporated into the firm's organized activities, as the figures show. Databases have been introduced by 36.6% of SMEs with PCs; and management systems have been introduced by roughly 60% of the large firms and 26.6% of the SMEs equipped with PCs.

b) Main activities through the Internet and e-commerce

The main activities conducted through the Internet were e-mail, contact with banks, and contact with public services. The most widespread application is e-mail, which is used by 81.7% of SMEs with an Internet connection, followed by dealings with banks (64.0%) and contacts with public services (61.6%). Over 70% of the medium-small and larger firms with Internet access are exchanging information with their banks and public institutions. Nonetheless, the main use of banking services by the SMEs did not involve money transfers.

Contacts with suppliers and customers, or e-commerce of some type, were poorly exploited even by large firms, with under 50% of those with Internet access using such services. Even when e-commerce is used, the main activities involved information exchange with suppliers and customers. In contrast, some SMEs use e-commerce in their businesses more actively than large firms. The proportions of those with Internet access that purchase inputs through the Internet (B2B) were 34.3% for medium-sized firms and 32.5% for the small-mediums, while the ratio for the large firms was 30.5%. In the case of online sales, the percentage of small firms (17.7%) was almost identical to the figure for large firms (17.9%), while the ratios for small-medium (20.0%) and medium-sized firms (20.3%) were higher than for large ones.

The potential benefits of the Internet and its application provide SMEs without a connection reasons to obtain Internet access. About 55% of them expected to improve their businesses by gaining useful information, contacts with suppliers and customers, and sales of their products and services over the Internet. They also cited productivity improvement and cost reduction from the connection as reasons to introduce the Internet.

Even when firms introduced e-commerce, they made insignificant use of it. Among the firms carrying out e-procurement, 52.5% of them purchased less than 5% of their total inputs online, with an equivalent figure of 56.5% in case of online sales. The origins of purchase and sales were mainly Chile (45% and 50.8% respectively), followed by transactions with both Chile and foreign countries (34.3% and 27.7%) and by foreign countries (20.8% and 7.9%). These transactions were paid through various methods, in particular cheques, especially in the case of B2B. A wider variety of payments means were employed for online sales.

c) Reasons for the lack of Internet connectivity and e-commerce

Budget constraints were the most significant barriers preventing firms from obtaining Internet access; roughly half of them gave this as the reason. Other frequent reasons included a lack of awareness or interest in it. Lack of interest was partly caused by an absence of Internet connectivity among the respondents' customers and suppliers.

"No need" was the leading reason for failure to use e-commerce to obtain inputs and sell products, followed by "non-use by suppliers/customers." Reasons of security accounted for under 5% (4.1%, 4.3%) in both cases.

In contrast to this, a more recent survey conducted in 2004 by the World Internet Project (WIP) Chile, the Catholic University of Chile and CCS revealed that 29% of Chilean users who do not purchase online mentioned "lack of security/privacy," and 8% of them "lack of confidence in suppliers" as reasons for hesitating to make purchases over the Internet. The privacy issue worried some 80% of Chilean users, with credit card fraud concerns affecting 72% and 75% of those questioned. Self-regulation by the private sector is recognized as a potentially effective countermeasure against the privacy issue by 51% of Chilean consumers.

d) Investment in ERM and CRM software

As noted above, ERM and CRM markets are expanding in Chile: 35% and 14% of Chilean firms have introduced ERM and CRM, respectively, according to CCS. Growth in these markets is being driven by an expansion of sales to medium-sized enterprises. Compared to the Latin American market, business software customers in Chile are heavily concentrated among medium-sized and large firms, although the share of medium-sized firms is expanding in Chile, while the share of large firms is expanding in Latin America as a whole.

TABLE 3
IT ACCESS AND USE BY CHILEAN FIRMS, 2002
(In percentages)

	Small	Sma-med	Medium	SMEs	Large	Total
Penetration (% of total firms)						
Fixed telephone	92.7	99.1	99.4	93.5	99.9	93.7
Fax	69.3	91.4	96.3	72.5	97.8	73.3
Computer	58.2	90.4	97.1	62.7	98.4	64.0
Internet	37.0	67.9	84.9	41.8	92.6	43.6
Dedicated line	15.7	29.4	44.5		64.5	19.9
Website	9.8	27.8	35.6	12.6	52.6	14.0
Reason for lack of Internet access (%)						
Budget constraint	47.5	38.4	37.4	47.0	33.6	47.0
Lack of knowledge and capability	28.1	30.6	32.3	28.2	32.7	28.3
No interest	20.1	26.2	26.8	20.5	31.0	20.5
Other	4.3	4.8	3.5	4.3	2.6	4.3
Reasons for introducing the Internet (%)						
Improvement of business	56.0	56.1	49.1	55.9	57.6	55.9
Improvement of internal management and productivity	19.9	22.0	30.1	20.1	19.3	20.1
Lower costs of connection	14.5	15.1	15.8	14.6	13.5	14.5
Other	9.6	6.9	5.0	9.4	9.6	9.4
Main activities carried out through the Internet (% of firms connected to the Internet)						
Contact with banks	65.7	78.6	79.2	64.0	84.5	69.7
Contact with public services	63.9	74.0	72.6	61.6	79.7	66.9
Contact with suppliers	27.5	35.4	35.0	31.8	42.7	30.2
Contact with clients	32.8	37.6	40.8	27.3	46.0	34.9
Main e-commerce activities with suppliers (% of firms engaging in Internet transactions with their suppliers)						
Inform on prices and offers	63.1	63.2	50.2	61.7	60.7	61.7
Quotes for inputs and services	52.5	58.4	59.8	55.2	66.6	55.2
Purchase of inputs and/or services	25.7	32.5	34.3	27.8	30.5	27.8
Information on order status	12.2	14.9	15.4	13.0	14.5	13.0
Main e-commerce activities with customers (%total firms engaging in Internet transactions with their customers)						
Send/receive information	73.3	78.3	77.6	74.5	75.6	74.7
Send quotes for their products and/or services	44.1	58.2	56.9	47.7	51.8	48.1
Exhibit catalogue of products	33.7	45.8	31.9	35.4	49.0	36.7
Sell products and/or services	17.7	20.0	20.3	18.4	17.9	18.3

Source: “Acceso y uso de tecnologías de información en las empresas chilenas”, Subsecretaría de Economía, Santiago de Chile, August, 2002.

TABLE 4
DISTRIBUTION OF SOFTWARE SALES IN CHILE BY FIRM SIZE
(In percentages)

	ERM				CRM			
	2000	2001	2002	2003	2000	2001	2002	2003
Large	62	70	63	59	70	87	88	65
Medium	30	22	29	30	28	12	10	33
Small	8	8	8	11	2	1	2	2
Total	100	100	100	100	100	100	100	100

Source: IDC Chile and CNC (September 2004), < <http://www.cnc.cl/>> (Estudios CNC–Informes–Comercio Electrónico).

Note: Small firm (10-99 employees), medium-sized (100-249).

TABLE 5
DISTRIBUTION OF SOFTWARE LICENCE SALES IN LATIN AMERICA
AND CHILE BY FIRM SIZE
(In percentages)

	Latin America				Chile			
	ERM		CRM		ERM		CRM	
	2001	2003	2001	2003	2001	2003	2001	2003
Large	53	62	85	75	70	59	87	65
Medium	32	23	10	22	22	30	12	33
Small	15	15	5	3	8	11	1	2
Total	100	100	100	100	100	100	100	100

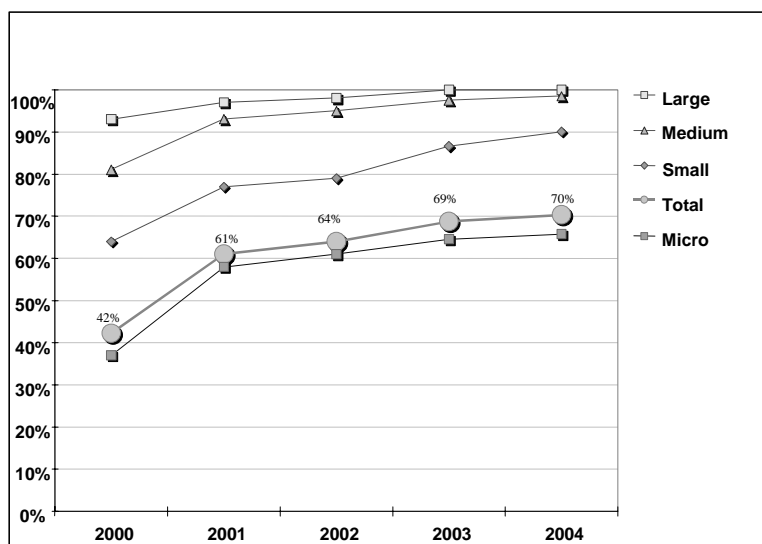
Source: IDC Chile and CNC (September 2004), < <http://www.cnc.cl/>> (Estudios CNC–Informes–Comercio Electrónico).

Note: Small firm (10-99 employees), medium-sized (100-249).

e) Recent trend of Internet access

The figure below shows improvements in Internet access among Chilean firms. Almost all of the large and medium-sized firms now have Internet connections, and accesses by small firms are approaching levels around 90%. Expansion among micro-enterprises is moderate by comparison. As noted above, more medium and large firms are adopting ERM and CRM in Chile than in other Latin American countries, so the issue for them is how to obtain maximum benefits from their IT investments. Nonetheless, a digital divide still persists among micro-enterprises.

FIGURE 3
PERCENTAGE OF CHILEAN FIRMS CONNECTED TO THE INTERNET



Source: CCS, October 18, 2004 <www.ccs.cl>

II. SME development in the IT revolution

A. Overview of the relative importance of SMEs in the economy at large

The definition of SMEs in Chile is poorly standardized even among government bodies. There are two important sources of data on SMEs, one being the Ministry of Economic Affairs and affiliated organizations such as the Corporación de Fomento de la Producción (CORFO). As mentioned above, these institutions classify Chilean firms on the basis of their net annual sales valued in UF. The other source is the National Socioeconomic Survey (CASEN) conducted by the Ministry of Planning and Cooperation (MIDEPLAN), which classifies firms by the number of people they employ.

1. The recent condition of SMEs

According to the Micro-enterprise and Small Business Development Committee (hereinafter the SME Committee Report, 2003), there were roughly 1,200,000 firms in existence in 2001. Of these, 652,445, or 54% were in the formal sector. Over 95% of formal firms are SMEs if they are classified by net sales. Micro-enterprises accounted for 82% of all formal firms while 15% were small enterprises; the shares of medium-sized and large firms were just 2.1% and 0.99% respectively.

The sectors in which SMEs have relatively greater presence are agriculture, manufacturing, commerce, and transport. About 70% of micro-enterprises and 60% of small firms belonged to these four sectors (SME Committee Report, 2003). CORFO (2000) provides more detailed information on SME market shares by sector. In 1997, 40% of micro-enterprises and small firms were operating in the commerce sector. The second largest sector was agriculture (12.2%), followed by transport (8.0%), personal and household services (7.2%), manufacturing (7.1%), and technical and professional services (5.5%).

SMEs make a major contribution to job creation. Figures published by the 2000 CASEN survey show that over 60% of employees work in firms employing less than 50 people. The role of the SMEs is more important in areas of the country outside the Metropolitan Region (*Región Metropolitana* (RM)), while the larger firms tend to be concentrated in RM. According to the

SME Committee Report (2003), in 2000 RM accounted for 71.9% of all large firms, 62.0% of medium-sized, 50.9% of small firms and 36.6% of micro-enterprises. Apart from RM, most SMEs are located in the V (Valparaíso) and XIIIth (Bío-Bío) Regions, while the X (Lakes) Region is also an area where SMEs have an active presence according to CORFO (2000).

2. SME Exports

a) Current situation

According to CCS figures, the total number of exporters was 6,409 in 2003, and the number had grown by 336 firms or 5.5% by 2002. Half of all exporters were micro-enterprises, while 2,919 small and medium-sized exporters accounted for 46% of the total.

The total value of exports grew by 16% to reach a level of US\$ 20.14 billion. While only 240 large firms shipped abroad, they accounted for 84% of the country's total exports. Large firms benefited from the rise in the copper price. In 2003, exports by large firms grew by 18.4%, whereas the corresponding rates among micro-enterprises, and small and medium-sized firms were 4.8%, 5.5%, and 1.5% respectively.

Although SMEs accounted for roughly 15% of total export value in 2003, the proportion would be approximately 30% if the mining sector is excluded. This is because the mining export account for over 50% of Chile's exports and is dominated by large enterprises.

The composition of exported products differed between large firms and other smaller enterprises. Manufactured products take a larger share among smaller firms. Exports by large firms were divided into mineral products, which accounted for over half of total export value, and manufactured products. In the case of SMEs, the leading export products were manufactured goods (76% of the total), followed by agricultural products (22%). About 90% of micro-enterprise exports consisted of manufactured products.

TABLE 6
EXPORT PRODUCTS BY FIRM SIZE IN 2003
(In percentages)

		Micro	Small	Medium	Large
Number of Exporters and Export Value					
Firms	(number of)	3 250	2 136	783	240
	(% of total)	(50.7)	(33.3)	(12.2)	(3.7)
Exports	(US\$ million)	42	609	2 513	16 977
	(% of total)	(0.2)	(3.0)	(12.5)	(84.3)
Export by Products					
Mining		0.8	1.9		51
Agriculture, forestry and livestock		11	22		6
Manufacturing		88	76		43
Destination by Regions					
Latin America		58	34		16
North America		19	25		18
Europe		15	23		26
Asia		5	12		36
Rest of the World		4	6		4

Source: CCS, 1 March 2004 <www.ccs.cl>

The main products exported by SMEs were in sectors relating to agriculture, fruit growing, livestock, forestry, and fishing. These accounted for about 22% of total exports in 2003. In the first quarter of 2004, fresh fruits, such as grapes, along with wines were the main SME export products.

The leading markets for micro-enterprises and SMEs are in the Americas. Exports are more diversified among larger enterprises. The Asian market is not very important for micro-enterprises and SMEs, with only 5% of micro-enterprise and 12% of SME exports being sent to that continent in 2003.

The export structure differs across regions, reflecting the diversity of industrial organization. According to DIRECON (2004), the most export-oriented regions are in the north of the country. In the II Region (Antofagasta) in particular, exports are dominated by large firms in the mining sector. Smaller exporters are located mainly in the RM and in V Region (Valparaíso).

TABLE 7
PRODUCTS EXPORTED BY SMES IN THE FIRST QUARTER OF 2004
(In millions of US\$)

Grapes (Sultanina)	26.5
Sawn board from Insigne Pine	25.9
Services	25.4
Grapes (Red Globe)	19.6
Wine (Red)	17.5
Wine (Cabernet Sauvignon)	15.1
Grapes (Flame Seedless)	15.0
Other Grapes	12.9
Apples (Royal Gala)	10.7
Raspberries	10.6
Fresh Plums	9.5
Wine (Merlot)	9.1
Wine (Merlot)	6.2
Other medicines	6.0
Onions, fresh or chilled	5.8
Coarse gold, except dust gold, for non-monetary use	5.8
Shrimps and molluscs	5.3
Other molluscs, prepared or conserved	5.1
Molded woods	5.1
Strawberries, including boiled or steamed, and frozen	4.9
Wine mixtures	4.7
Other wines with denomination of origin	4.6
Nectarines, fresh	4.6
Grapes (Morenas), dried	4.5
Trout, beheaded and gilled	4.3
Frozen fish, beheaded and gilled	4.2
Sawn timber (Lenga)	4.2
Atlantic and Danube salmon	4.1
Natural honey	4.0
Copper; miscellaneous remains and scraps	4.0

Source: CCS <www.ccs.cl>

TABLE 8
PROFILE OF EXPORTS AND EXPORTERS BY REGION

Region	Exports/ GDP (%) ^a	Employ- ment (1,000)	Export firms ^b			Export value (US\$ 1,000)		
			Micro	SMEs	Large	Micro	SMEs	Large
I	58.0	33.4	69	74	22	1.9	17.0	1 195.7
II	87.3	36.8	27	53	31	0.8	12.8	4 478.6
III	68.8	35.4	32	48	30	0.9	13.2	912.8
IV	42.0	82.1	46	106	45	1.2	36.1	726.8
V	24.7	124.6	130	224	94	3.9	54.6	1 356.5
VI	46.5	130.8	93	168	90	2.8	39.4	1 328.2
VII	17.9	141.5	80	177	58	2.4	47.0	403.3
VIII	39.6	211.2	76	177	124	2.2	49.5	2 339.7
IX	1.6	115.4	29	41	4	0.8	9.6	14.8
X	34.4	162.4	79	162	103	2.5	48.0	1 045.5
XI	42.3	12.3	9	11	10	0.3	5.5	132.1
XII	46.6	16.8	49	53	24	1.3	13.3	412.2
RM	8.2	678.9	715	1 453	47	20.4	1 027.4	1 195.3

Source: “Comercio Exterior de Chile, Cuarto Trimestre 2003”, Ministerio de Relaciones Exteriores de Chile, Direcon, February 2004.

^a Exports of goods and services in 2000, GDP (1996 price).

^b Micro-enterprise exports (US\$ 15,000-50,000), SME exports (US\$ 50,000-10 million).

b) The weakness of Chilean SMEs

The export performance of SMEs will depend not only on the market conditions for their products but also on the capabilities of the SMEs themselves. The CCS study “Diagnostic study of SME Management in 2003” found that the weakest areas among Chilean SMEs were quality management, information management, and marketing and sales (CCS, 17 November 2003). In other words, SME management concentrated on supply-side aspects rather than their customers, although they also had problems that are common to SMEs throughout the world, such as financing and human resources. In the production and operations field, planning and inventory management were the areas needing most urgent solution. In the funding domain, SMEs lacked abilities in financial management and cost analysis. In short, the weaknesses identified in Chilean SMEs are closely related to financial, technological and cultural contexts, and those to which large firms apply IT tools and solutions effectively.

The recent export growth, from which large firms are benefiting more than SMEs, is revealing a physical distribution bottleneck for the Chilean export-led economy. The growth in exports from Chile causes a shortage of space on ships and containers for exporters. The consequent increase in transport costs lowered the relative burden of customs duties for exporters, although Chilean exports have been driven by FTAs. In 2003, the average tariff cost was estimated under 3%, while transport costs were equivalent to 7.5% and expected to rise to about 9% in 2004. The consequent increase in transport costs seriously harms small- and medium-sized exporters (SMEXs), which do not export their products regularly in high volumes and therefore cannot benefit from long-term contracts with shipping companies. Although transport costs represented 8.0% of export value (US\$ 37/ton) for large firms, the equivalent figure was 11.4% (US\$ 90/ton) for SMEs and 11.1% (US\$ 150/ton) for micro-enterprises (CCS, 25 March 2004, 17 May 2004).

B. Case studies on the use of e-commerce and supply chain management (SCM) in selected industries

1. Background to the policy issue in Chile

Information technologies can benefit SMEs through: (a) effective use of IT applications in their businesses, including administration, product management and collaboration with other firms, and (b) the development of new IT-related businesses such as hardware manufacture, software development, R&D and other services. The latter benefits are more promising than the former, to judge from experience in India. Some developed and developing countries have already achieved high rates of economic growth driven by the IT sector. For this reason, projects to develop the IT industry are being implemented worldwide, while scarce human and capital resources are a serious obstacle, especially in developing countries. In contrast to growth in the IT sector, there are various discussions taking place over the effects of IT investments in business management. In particular, economists have not reached consensus regarding the macroeconomic effect of IT investments. Nonetheless, some countries are encouraging their business sector, especially SMEs, to introduce ITs in order to improve their efficiency and competitiveness.

Chile faces the same challenge, although it has different policy priorities compared to other countries. The country recognizes a major opportunity to develop the IT sector. Its political, economic and social stability, together with an abundant, well-educated and skilled labour force, and well-established IT infrastructure compared to other Latin American countries, provide better conditions for promoting the IT-related sector. On the other hand, the existing industrial organization is based on the country's comparative advantage in natural resources and environmental conditions.

The current weakness in the IT sector makes the software development business a medium-to-long-term policy issue for Chile. In order to reap the benefits of the comparative advantage originating from non-natural resources, the country has begun to implement a policy to promote FDI by foreign firms from Chile to other countries in Latin America. The aim of the policy is to turn Chile into a business platform for multinational companies (MNCs) in Latin America, and to stimulate growth in IT-related and other service sectors.

The most pressing policy issue is to maintain and strengthen the international competitiveness of existing export sectors in an ever-changing economic environment and competitive conditions on the world market, and Chile's active free trade policy. Information technologies are seen as tools to increase efficiency in existing industries and to enhance the value added of products and services. From this perspective, one of the best scenarios for IT development in Chile involves creating complementary relations between IT sector development and efforts to improve the competitiveness of existing sectors, by implementing IT applications developed by indigenous IT enterprises.

The following subsections present case studies of the potential for using IT applications and developing an IT-related industry. As these projects are in their early stages, it is impossible to evaluate the results. Those selected are food traceability and development of the IT sector. The first case concerns efforts made in a public-private-partnership to tackle a pressing problem faced by the country's main export sectors, namely ever more stringent demands for food safety in Chile's main export market. The second case is a common policy issue for developing countries. Some of the policy instruments used in Chile are common among developing countries, so the country will need to establish comparative advantage to trigger growth in the sector.

2. Case 1: Development of food safety systems

a) The need for food safety management

The food industry is Chile's leading export industry after mining. According to the statistics on products exported by Chile published by the Chilean Industry Federation (Sociedad de Fomento Fabril (SOFOFA)), copper (produced by large firms) accounted for 36% of total exports in 2003. Other representative export products include fruit and other agricultural, forestry, and livestock products, along with salmon and other fishery and processed marine food products. The non-copper export sectors are also growing strongly. The value of non-copper exports grew by 17.5% between 2000 and 2003, whereas copper exports expanded by just 2.6% during the same period.

The leading food-related exports are agricultural products, foreign sales of which increased by about 20% between 2000 and 2003; salmon and trout exports also grew rapidly in 1995-2003. Livestock exports have been growing rapidly since the start of the new millennium, with export value doubling between 2000 and 2003.

TABLE 9
EXPORTS OF AGRICULTURE, LIVESTOCK AND SALMON PRODUCTS
(In millions of US\$)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Agriculture	2 095	2 510	2 458	2 729	2 738	2 681	2 629	2 758	3 186
Livestock	113	116	164	169	165	192	266	285	406
Salmon and trout	489	538	668	714	818	973	964	973	1 147
Total Exports	16 024	16 627	17 870	16 323	17 162	19 210	18 272	18 177	21 046

Source: "Inserción de la agricultura chilena en los mercados internacionales", ODEPA, 2004, Export of Agriculture and Livestock, December <www.odepa.cl>; Export of Salmon and Trout, Asociación de la Industria del Salmón, 2004, Salmon Chile's <www.salmonchile.cl>; Total Export, Banco Central de Chile, 2004 <www.bcentral.cl>

Despite high expectations of strong export growth, these sectors have been forced to restructure their management and improve product quality, especially food-safety management, in order to develop their main markets in Europe and North America. The following changes in the market environment are encouraging Chilean firms to introduce management innovations:

(i) Demands for food safety from consumers

The outbreak of Bovine Spongiform Encephalopathy (BSE), also known as "Mad Cow Disease," has drastically affected consumer confidence in overall food safety. In Japan, consumers have become particularly sensitive to food safety following a series of outbreaks of BSE and avian influenza. Increasing numbers of consumers in developed countries are demanding safer foods and detailed information on the safety of the foods they purchase, specifying items such as place of origin, producer, ingredients and so forth. In order to meet these demands, all firms participating in food supply chains have to control their production and distribution processes in line with a variety of food hygiene and environmental standards; and they are required to record and share information certifying their compliance with the required standards. Nonetheless, these requirements provide well-controlled products with additional business opportunities, and lead to improved efficiency throughout the logistics process.

(ii) *Regulations established in export markets*

In addition to the demand for food safety from consumers, the increasing terrorism threat resulted in exporters to the United States having to submit detailed information to the United States Government before their products could enter the country. The Bio-terrorism Act of 2002 requires domestic and foreign facilities that manufacture/process, pack, or store food for human or animal consumption in the United States to register with the Food and Drug Administration (FDA). All relevant facilities were obliged to register by December 12, 2003, with FDA encouraging electronic registration.

The Act also requires prior notice of food imports into the United States as from 12 December 2003. Most of the information required by the new regulation involves data that is usually provided by importers or brokers to the Bureau of Customs and Border Protection (CBP) when food products arrive in the United States. The Bio-terrorism Act requires this information also to be provided to FDA ahead of the product's arrival in the country. The Administration expects prior notice to be submitted using the CBP Automated Broker Interface of the Automated Commercial System (ABI/ACS).

In case of the European Union, food and animal feed imported for sale in the single market has to comply with the requirements of the General Food Law (CE/178/2002). This contains general provisions on "traceability," which is defined in ISO-8402 as the "ability to trace the history, application or location of an entity by means of recorded identifications." This regulation, which comes into force on 1 January 2005, assumes that food or feed business operators will have systems and procedures in place at least to identify the immediate supplier of the product in question and the immediate subsequent recipient, with exemptions for retailers to final consumers (one step back-one step forward). Furthermore, food or feed placed on the EU market must also be adequately labelled or identified to facilitate its traceability.

(iii) *Free Trade Agreements with the United States and the European Union*

The Chile-U.S. and Chile-EU FTAs have already entered into force. These agreements opened the world's two largest markets to Chile, although its industries have to compete with large firms from developed countries under equal conditions. Chilean firms are being forced to prepare for competition not only with the firms in the countries with which it has already concluded FTAs but also those in potential FTA-based partners that export agricultural products such as New Zealand.

b) Food-safety management and traceability system

In order to meet a broad range of food products requirements, well-organized control systems and monitoring by third-party organizations are essential. In practice, there are initiatives and standards to respond to consumers' concerns on food safety, animal welfare, environmental protection and worker health, safety and welfare.

As shown in figure 4 below, different management systems are required for the different issues of concern and stages in a value chain. For example, Social Accountability International (SAI) in the United States developed SA 8,000 as a workplace standard and verification system for retailers, brand companies, suppliers and other organizations, to ensure fair and decent working conditions in the supply chain. Some systems such as the British Retail Consortium Standards (BRC) cover multiple issues.

Food-related standards and regulations are being harmonized at the *Codex Alimentarius* Commission—the international food standard-setting organization created by the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO). At the same time, each country is revising its standards in order to respond to new issues and increasing demands for safety from consumers.

FIGURE 4
MANAGEMENT SYSTEMS IN THE FOOD SECTOR

Aspect	Production	Packing and Storage		
Quality	EUREPGAP	ISO 9001		
Hygiene and food safety		EUREPGAP	US GAP	GMP
				HACCP
Environment		ISO 14001		
Labor		SA 8000		
Security		FDA safety guide		

Source: PowerPoint presentation by Alexis Ortiz.

Standards prevailing in the United States and European Union influence the behaviour of exporting countries. In the United States, Good Agricultural Practice (GAP) and Good Manufacturing Practice (GMP) set voluntary minimum standards to maintain hygiene both in farming and in packing and storage processes. The former covers production practices including growing, harvesting, handling, and transportation, while GMP primarily addresses harvesting and transportation, but also includes aspects of manufacturing such as processing and packaging.

The Hazard Analysis and Critical Control Point (HACCP) established by the United States Food and Drug Administration (FDA) is a means of assuring food safety from harvest through to consumption and aims to prevent problems. In order to accomplish this goal HACCP invokes the following seven principles: (i) Hazard analysis (HA); (ii) Identify critical control points (CCP); (iii) Establish preventive measures with critical limits for each control point; (iv) Establish procedures to monitor the critical control points; (v) Establish corrective actions to be taken when monitoring shows that a critical limit has not been met; (vi) Establish procedures to verify that the system is working properly; (vii) Establish effective record-keeping to document the HACCP system. The scope of HACCP is expanding to various food industries such as low-acid canned food, seafood, juice, and the meat and poultry processing industries. HACCP has been endorsed by the Codex Alimentarius Commission and is therefore accepted internationally.

In the European Union EUREPGAP was originally an initiative by retailers belonging to the Euro-Retailer Produce Working Group (EUREP). The initiative has subsequently evolved into an equal partnership of agricultural producers and their retail customers for the purpose of developing widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP).

The EUREPGAP scheme principles are premised on the following: (a) the standard is based on food safety criteria derived from the application of generic HACCP principles; (b) the standard for environmental protection, which is designed to minimize negative impacts of agricultural activity; (c) occupational health, safety and welfare, and (d) animal welfare. To uphold these principles, the system introduced the concepts of ISO-standards such as ISO-9000:2000 and EN 45011/ISO-Guide 65.

The EUREPGAP Scheme consists of three documents: EUREPGAP General Regulations; EUREPGAP Control Points and Compliance Criteria; and the EUREPGAP Checklist, which is a tool for inspecting and evaluating compliance. Both individual farmers and farmer groups can apply for EUREPGAP Certificates and EUREPGAP Benchmarked Scheme Certificates. The Scheme applicable to Benchmarking (Applicant Scheme) is assessed for equivalence by comparing content and performance criteria against EUREPGAP. The farmer/farmer group applying for the certifications is required to perform internal self-inspection and undergo external verification by the EUREPGAP-approved Certification Body (CB).

In case of the Group Certification of EUREPGAP Fruit and Vegetables, applicants are required to establish a quality system that ensures all internal inspections are undertaken in a competent way; this includes a traceability system. EUREPGAP defines traceability as “the ability to retrace the history, use or location of a product (i.e. the origin of materials and parts, the history of processes applied to the product, or the distribution and placement of the product after delivery) by the means of recorded identification,” which is quite similar to the ISO-8402 definition: “ability to trace the history, application or location of an entity by means of recorded identifications.” Traceability is recognized as an indispensable system that enables the EUREPGAP certified product to be segregated from a non-certified product, and to be traced back to the farm or group of farms from which it originated, when non-compliance is detected.

c) The concept of traceability and international movements

The concept of traceability is gradually being accepted internationally. The CODEX Committee on General Principles defined traceability/product tracing as the ability to follow the movement of a food through specified stage(s) of production, processing and distribution.

The purpose of establishing the traceability system is to take suitable corrective actions in the face of non-compliance with standards, to avoid a recurrence of the non-compliance, and to minimize economic damage by segregating the smallest possible amount of the produce and derived products. It also enables producers to improve the management of production, logistics and inventory control, and to give consumers confidence in food safety. From a practical standpoint, these requirements are enabled by using information systems.

A traceability system can be divided into “tracking” and “tracing” according to materials and data flows (figure 5). EUREPGAP defines tracking and tracing as indicated below (EUREPGAP, General Regulations Fruit and Vegetables, version 2.1, January 2004):

“Product tracking is the capability to follow the path of a specified unit of a product through the supply chain as it moves between organizations. Products are tracked routinely for obsolescence, inventory management and logistical purposes. Within the context of EUREPGAP Fresh Fruit and Vegetables, this means tracking produce from the farmer to his immediate customer.

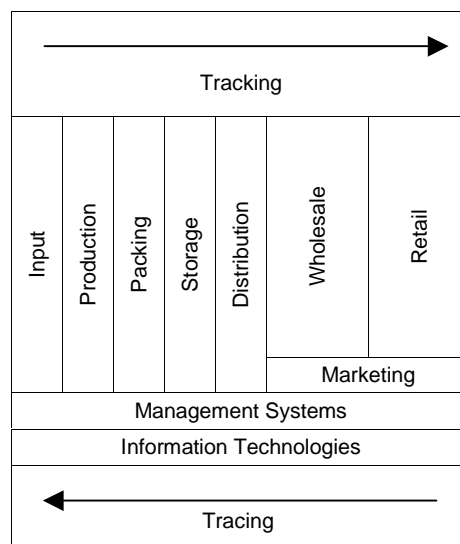
Product tracing is the capability to identify the origin of a particular unit and/or batch of product located within the supply chain by reference to records held upstream in the supply chain. Products are traced for purposes such as product recall and investigating complaints. Within the context of EUREPGAP Fresh Fruit and Vegetables, this means tracing produce from the farmer’s immediate customer back to the farmer and certified farm.

- From the point of view of the user, traceability may be defined as following-up products in both a qualitative and quantitative manner within space and time.
- From an information management point of view, implementing a traceability system within a supply chain involves systematically associating a flow of information with a physical flow. The objective is to be able to obtain predefined information concerning batches or groups of products (also predefined) at any given moment, using one or more key identifiers.”

Traceability systems can be established within a given link, firm or plant, for the purpose of its internal management (internal traceability). In this case, the coverage of the system is restricted to within one part of the product supply chain in which the firm participates. In order to extend the system beyond the boundaries of a single enterprise, firms located at different points on the product supply chain should share information to establish “external traceability” or “chain

traceability.” In practice, SMEs cannot provide consumers with significant benefits without participating in a chain traceability system.

FIGURE 5
VALUE CHAIN AND INFORMATION FLOWS IN THE FOOD SECTORS



Source: PowerPoint presentation by Alexis Ortiz.

The establishment of chain traceability will be based on data standards relating to: (i) a unique identifier giving access to all available data on the history, application or location of a traced or tracked entity; (ii) definition of the data to be captured and recorded throughout the supply chain; (iii) data linkage; and (iv) data communication. EAN International is one of the representative institutions in this field.

The EUREPGAP general regulations specify the EAN Global Location Number (GLN) as additional voluntary information that farmer/farmer group may provide when applying for EUREPGAP certification. A GLN is a number that identifies any legal, functional or physical location within a business or organizational entity. It serves as a key to retrieving information from databases such as: postal address; type of location (manufacturing centre, warehouse, sales office, corporate headquarters); region; telephone, fax numbers; contact person; bank account information; delivery requirements or restrictions.

EAN International is developing traceability guidelines for fresh produce (fruits and vegetables), fish, and beef, while also collaborating with industrial organizations to develop numbering and coding systems for agricultural inputs, wine and spirits, and processed foods and beverages. EAN International has received support from its member organizations around the world, including some Latin American countries, in developing guidelines for fresh produce and beef. The organizations in Europe, especially Northern Europe, participated in formulating the fish traceability guideline.

d) The framework for developing food safety management systems in Chile

The new requirements and projects for establishing traceability systems encompass Chile's main export products such as fruits, wine and fish, and are implemented in its main export markets in North America and Europe. Chilean producers and exporters are forced to meet the

new challenges. Nonetheless, between 1997 and 2002 Chile issued fewer certificates than Venezuela for ISO-9000 (quality management) or Colombia for ISO-14000 (environmental management). Public-private collaboration to attain the objectives are currently underway. As a result of the quality management programme being promoted by CORFO, the number of firms obtaining certifications (ISO-9000, ISO-14000, HACCP and others) rose from 304 in 2001 to 935 in 2003 (Jorge Rodríguez, Minister of Economic Affairs, Workshop-Seminar “*Inserción internacional de las PYMES*,” January 2004).

Activities to develop reliable systems for ensuring the safety of produce and products can be divided into three stages: establishment of health and safety standards; standardization of data format for traceability; and development of guidelines for traceability information systems. The main initiatives in Chile for improving food safety and labour conditions are: (i) the Clean Production Agreement and (ii) Good Agricultural Practice (GAP/BPA).

TABLE 10
NUMBER OF ISO-9000/14001 CERTIFICATIONS ISSUED IN 2002

Latin America and the Caribbean	ISO-9000	ISO-14001	Asia Pacific	ISO-9000	ISO-14001
Argentina	2 260	249	Australia	27 135	1 485
Bolivia	31	4	Brunei	79	3
Brazil	7 900	900	Cambodia	8	
Chile	327	55	China (*)	75 755	2 803
Colombia	1 838	69	Indonesia	1 947	229
Costa Rica	89	38	Japan	33 964	10 620
Cuba	34		Korea, Republic	14 520	1 065
Ecuador	34	1	Laos		
El Salvador	12		Malaysia	3 733	367
Guatemala	22	1	Myanmar	5	1
Mexico	2 508	369	New Zealand	2 069	78
Nicaragua	11		Philippines	766	124
Panama	49	1	Singapore	5 379	441
Paraguay	65	4	Thailand	4 556	671
Peru	270	25	Viet Nam	612	33
Uruguay	231	32			
Venezuela	342	17			

Source: *ISO Survey 2004* <www.iso.org>

Note: China does not include Hong Kong (China).

(i) The Clean Production Agreement (APL)

The Clean Production Agreement (APL) is an instrument administered by the National Council for Clean Production to promote activities for environmental protection, hygiene and labour safety. It is intended as a preliminary step for firms on the road to obtaining international certifications such as ISO-9000 and ISO-14000. Moreover, efforts to minimize pollution are expected to increase competitiveness of firms in Chile. Sectors making agreements with the public sector will deploy specific measures to achieve the agreed targets within the prescribed period, and CORFO will provide financial support to implement them.

Since their inception in 1999, APLs have been concluded between the public sector and representative industrial associations, and with over 1,200 private firms from 10 sectors, including construction and chemicals (as of January 2003). Among these, the APL for implementation of GAP has been signed by 884 firms in III-VIII and X Regions. The APL for

pork production was signed by 42 firms in V-VIII and Metropolitan regions. In the X Region, 48 firms in the salmon sector are participating in the agreement. The wine sector also participated in the programme in 2003.

The National Policy for Clean Production 2001-2005, which was approved by the Council, involves the use of information technologies as tools to develop clean production capacities. ITs are expected to promote the transfer of clean technologies by promoting information exchange, interaction and transaction among producers and clean production networks.

(ii) Good agricultural practice (GAP/BPA)

The agricultural sector launched Good Agricultural Practice (BPA), as a programme to define Chilean standards of good agricultural practices for compliance with food safety requirements in North America and Europe. GAP in Chile is coordinated by the National Commission on Good Agricultural Practice created by the Ministry of Agriculture. Both the public and private sectors are included in the programme. The commission publishes the technical specifications of ChileGAP for the following 10 sectors: pigs, bovine meat, bovine milk, sheep, goat, laying hens, chickens, maize, potatoes, vegetables, fruits, wheat, and rice. The requirements specified by ChileGAP are equivalent to those of EUREPGAP.¹

The ChileGAP technical specifications define the minimum standards to be considered when preparing GAP programmes. The specifications for livestock farming (pigs, bovine meat, bovine milk, sheep, laying hens, and chickens) encompass (a) facilities, pest control; (b) health management; (c) feeding and water; (d) animal transport; (e) animal registration and identification; (f) animal wellbeing; (g) labour conditions; (h) environmental management. In addition to these, the specification for laying hens includes an item relating to egg handling. The specifications for maize, potatoes, vegetables, wheat and rice include (i) cultivation; (ii) use of phytosanitary products; (iii) fertilizer use; (iv) water use and management; (v) animals on the estate; (vi) transport of production; (vii) control of vectors and pests, and (viii) labour conditions. Each specification clarifies the items that farmers are required to register, along with related information.

e) Development of a traceability system for the fresh fruit sector in Chile

The traceability system is based on information recording and registration. Information systems for traceability will be established on the basis of management systems, to make their operations more efficient and reliable. These processes and systems will be based on standards that make it possible to maintain verifiability, interoperability and data exchange between different entities.

Chile's food sectors are encouraged to fulfil traceability regulations and standards developed in their main export markets. Regulatory agencies and industrial associations are also collaborating to develop the necessary regulations and design and disseminate standards. For example, the Crop and Livestock Agency (Servicio Agrícola y Ganadero (SAG)) has developed a system for the registration of farmers, cattle and cattle movements (<http://www.trazabilidad.sag.gob.cl/>). EAN-Chile has developed Traceability Guidelines for pig and poultry farming. This section briefly describes activities to develop Chilean traceability systems using mainly the fresh fruit and salmon sectors as examples.

¹ "ChileGAP (Version 01 Nov.2003 Rev002) has been benchmarked successfully to the EurepGAP Fruit and Vegetables Normative Document (version Sep-2001). Until the first Certification Body has been accredited to the ChileGAP scheme itself, growers that comply with the ChileGAP Scheme will also receive a EurepGAP certificate. Ultimately, a single certificate can be issued." (ChileGAP, 2004).

(i) *The fresh fruit sector*

The fruit sector is one of Chile's leading export sectors. Fruit growing covered an area of 211,386 hectares in 2001, with roughly 50% of the production exported as fresh fruit. The volume of processed fruit is estimated at 25% to 30% of total output. SMEs participate in the supply chain in this sector. While large-scale farmers account for 50% of the cultivated area, small and medium-scale farmers have shares of 25% and 20% respectively.

In addition to the fruit sector, there were 116,770 hectares of vineyards producing white and red wines and *pisco*. Here smaller-scale farmers have a larger share: roughly 40% (medium-scale farmers account for roughly 15%). There are some 120 key players producing Chilean wines; most of them are medium-sized enterprises (ODEPA, 2002).

The fact that fruit-related sectors rely heavily on the foreign market forces Chile to respond to the demand for establishing traceability systems in developed countries; and the high participation of SMEs in the corresponding value chains makes it essential to incorporate them in such systems.

(ii) *ChileGAP*

Traceability will become reliable only after secure quality management has been established. Chile has introduced European models for quality management of agricultural products. In order to encourage widespread use of these models, the public sector, represented by the Ministry of Economic Affairs, Health, and Agriculture, CORFO, the National Environment Commission (CONAMA), and the National Council for Clean Production, and the private sector represented by the Fruit Producers Foundation (*Federación de Productores de Fruta* (FEDEFruta)), the Exporters Association (*Asociación de Exportadores* (ASOEX)), together with private firms, concluded an APL in which fruit exporters made a commitment to adopt ChileGAP.

As of June 11, 2003, there were 1,320 programme participants in all: 52 exporters, 71 mechanized packing firms, 287 grape packing firms, and 910 fruit orchards and producers. The technical aspects of the programme are handled by the Fruit Development Foundation (FDF), an organization that has developed GAP guidelines and manuals and offers training and advisory programmes.

(iii) *Encoding standards for identifying the units of traded goods*

Traceability is developed on the basis of information, documents, and labels that are registered, submitted, or stored in accordance with GAP specifications and those of the SAG, or prepared for the purpose of business transactions and trade-related procedures. A well-coordinated standard for encoding the data collected is essential for facilitating chain traceability electronically.

EAN International and its affiliate organization EAN-Chile are actively working to develop the "global business language," a set of standards designed to improve supply chain management (SCM). Traceability is one of the urgent issues to be resolved before the enforcement of EU laws requiring traceability. The organization is designing traceability guidelines in cooperation with industrial sectors.

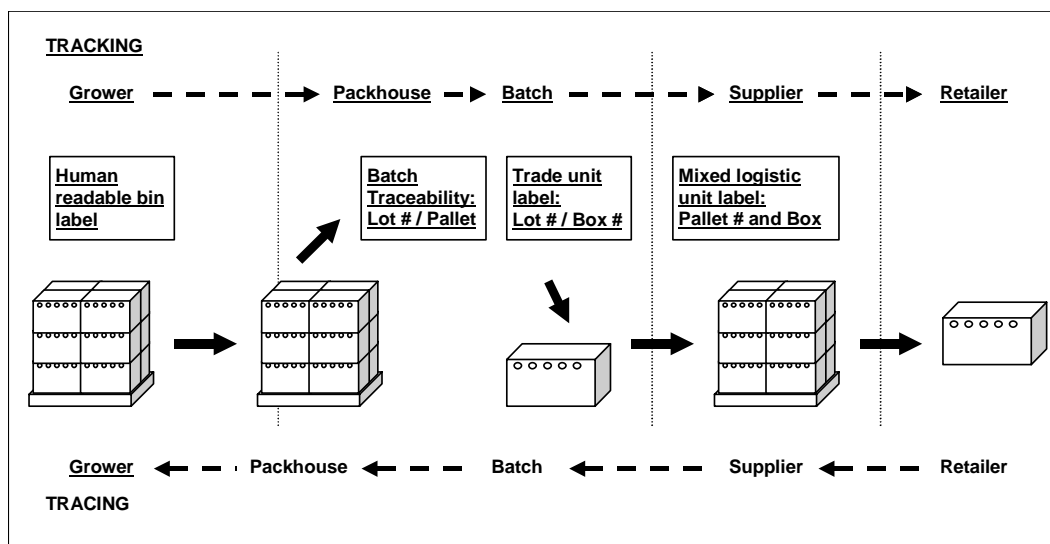
Fresh Produce Traceability (FPT) guidelines were developed in conjunction with the EuroHandelsinstitut (EHI), the European Association of Fresh Produce Importers (CIMO), the Euro Retailer Produce Working Group (EUREP), the European Union of Fruit and Vegetable Wholesale, Import and Export Trade (EUCOFEL) and the Southern Hemisphere Association of Fresh Fruit Exporters (SHAFPE). These voluntary guidelines define minimum requirements for the traceability of fresh produce, thereby providing a common approach to the tracking and

tracing of fresh produce through the European Article Numbering-Uniform Code Council (EAN-UCC) numbering and bar coding system.

Under FPT guidelines, information flows (shown as broken arrows in the following diagram) accompany the physical flows of fresh produce throughout the fresh produce supply chain in order to assure traceability. Coordination of the codes generated when there is a change of transport units is a complicated but crucial task.

In order to track and trace products, supply chain participants have to identify at least the location from which the fresh produce originates and where it is packed and stored, together with the trade and logistic unit. For this purpose EAN-UCC prepares the following encoding systems: Global Location Number (GLN); Global Trade Item Number (GTIN); Serial Shipping Container Code (SSCC). By keeping records of the serial numbers of logistic units (SSCC), identification numbers (GTIN) attributing information on traded units and location numbers of their origin (GLN), growers and packers can provide the traceability data needed by importers/exporters and distributors, and by their customers.

FIGURE 6
TRACEABILITY MODEL FOR THE FRESH PRODUCE SUPPLY CHAIN



Source: "Traceability within the Chilean Fresh Fruit Export Industry", presentation material prepared for IDtrack-FoodTrace European Conference on Food Traceability, E. Araya, 2003.

(iv) Traceability

Traceability in the fruit sector is developed on the basis of the documents, information and labels that are required to register, submit, and store in accordance with specifications issued by ChileGAP or the Crop and Livestock Agency (SAG), or for the purpose of trade-related procedures. Record sources for tracking, which is a key element in tracing, include dispatch documents, invoices, purchase orders, packing lists and so forth, most of which are basic tools for logistics and related activities. The essential elements for tracing are mainly records kept by farmers and packing houses, which are required for registration by ChileGAP, or for submission or labelling by SAG.

For example, SAG requires participants in the frozen and fresh raspberry supply chain to maintain information on the origin and destination of the fruit. Processing plants and exporters

are required to inform their suppliers of the need to keep such information. The parties concerned, or processing plants, harvest centres, traders, and exporters, can voluntarily include codes identifying the supplier, batch and total volume of production, among other items, when they register mandatory information on their suppliers' cards and daily registry for fruit receipts. They are also required to maintain daily product dispatch records.

In the past, some firms might have maintained this data and had capabilities to respond to enquiries, but data management in the field was not easy without automated processes and an Internet connection. Nonetheless, a generic standard is essential for assuring accuracy and precision in the records, and the efficiency of data sharing and retrieval for tracking and tracing. For this reason, the Government of Chile is collaborating with agribusinesses to promote ChileGAP, and EAN-Chile encourages voluntary use of the EAN-UCC system.

Araya (2004) summarizes the practice of traceability within the Chilean fresh fruit industry. According to his report, Chilean producers can be classified as (a) growers with their own packing facilities, or (b) growers that pack their produce in an external pack house. The phyto-sanitary regulations implemented by SAG require producers to label the commercial units (cases) with the names of both the grower and the packer. They can register their own codes with SAG and the U.S. Animal and Plant Health inspection Service (APHIS) under the bilateral agreement.

GAP certification and the establishment of traceability starts by identifying the individual farm and orchard in order to certificate produce origin. For this purpose, each farm or orchard obtains its identification registered with SAG. Farmers can use the GLN code provided by EAN-Chile. Farmers with BPA certification have to indicate such identification in every orchard.

Each orchard is divided into "blocks" and each block is segmented into "plots". Plots are planted areas normally bounded by internal roads or borders. At the farming stage, traceability is implemented by each block, which is defined as a group of plots with the same cultivar and similar handling or management. Farmers are required to register in their "field log book" all of the activities implemented in a farm such as hygiene, pesticides, fertilization, irrigation, and so forth.

A similar system to that used on farms is applied to the packing process. Each field packing and packing house needs to be registered with SAG and can use the GLN code voluntarily. The packing logbook is used to record all the process controls carried out in packing facilities. In addition, the Chilean Exporters Association (ASOEX) uses standard labelling. The information labelled on cases such as variety, calibre, size, pack date, name of grower and packer, lot number and box number, facilitates logistics and traceability management. Exporters also use their own system with identification, unique numbers and bar codes for pallet management.

f) Case studies in the salmon farming sector

The requirement to develop traceability systems is not confined to the fruit sector. Food-related sectors produce Chile's main export products, so traceability system development is a common issue for all of them. Each sector can therefore benefit from the experience gained by others. Nonetheless firms in a given sector may not develop the system with precisely the same approach taken by other sectors, since market demands and the technical standards imposed on specific sectors vary. As the basic issues involved in traceability have already been explained in the case of the fruit sector, the case of the salmon farming sector will be outlined briefly in this subsection.

(i) *The salmon farming sector*

Chile is the world's second largest salmon producer, accounting for 35% of all farmed salmon and trout in 2002. The sector became the country's fourth largest export category in 2003 with a value of US\$ 1,147 million, representing 5.6% of Chile's total exports. The leading foreign markets are the United States and Japan. Production is concentrated in the southern part of the country, with a cluster encompassing over 200 firms in the X and XI Regions, of which 70% are located in the X Region (Salmon Chile).

Although the products are exported by a few domestic and multinational firms as mentioned below, the supply chain consists of a variety of lines of business such as the manufacture of pisci-culture and breeding cages, nets and floating houses; warehouses; salmon feed companies; laboratories, vaccines and drugs; air and land transport companies; underwater services; quality control; training centres; educational establishments; financial entities; insurance companies; and specialized legal consulting and advisory services.

A study conducted by SalmonChile in 2003 showed that 51.6% of the industry's production costs were generated by farming operations, 18.9% by processing costs, 18.5% by transport and sales, and 11% by management, financing, and other items. Another study estimated that 57.8% of all materials and services are wholly Chilean (Aquaculture in Chile, TechnoPress).

(ii) *Requirements imposed on the sector*

The salmon cluster is concentrated in the X Region and its neighbouring regions, where natural conditions are plentiful. For this reason, the sector is required to coordinate in responding to international issues such as "sustainable development," "product quality" and "health and security of workers." Firms in the salmon sector have joined the clean production agreement (APL) as mentioned above.

In brief, the sector should be satisfied with at least the following requirements: national and international regulations; APL; ISO-9000, 14000; HACCP and Good Manufacturing Practice (GMP); and others such as OHSAS 18000 (an international occupational health and safety management system).

(iii) *Sistema Integrado de Gestión (SIGES)*

The Chilean Salmon Industry Association (SalmonChile) and its affiliated Salmon Technology Institute (*Instituto Tecnológico del Salmón* (INTESAL)) developed the Salmon Industry Integrated Management System (SIGES).

This is a voluntary system enabling the salmon industry to establish verifiable good practices and standards in order to guarantee compliance with the requirements mentioned above. SIGES consists of the following elements: agreement; good practices manual; auditing manual; online training courses; and support software.

Trial installation of the system began in mid-2003 among seven firms representing 40% of national production. ChileSoft, an IT firm, developed the associated software and traceability system. From mid-2004 onwards, implementation of the system moved into the expansion phase, with the aim of certifying 80% of domestic production under the system (SalmonChile, and Revista Certificación, May 2004).

g) Development of a platform for food traceability

The technologies and information for traceability need to be accessible to both producers and consumers, enabling them to handle data efficiently and enhance its credibility. Nonetheless,

only some of the large firms have established internal systems for this purpose. Except for industries that consist of large vertically integrated firms, one of the urgent issues is to build platforms that are available to SMEs at low cost. The development of web-based systems is one way to meet these requirements and regulations on food safety in the European Union, Japan, and the United States.

In practice, there are private Chilean firms offering IT solutions for traceability, such as the CS18000 solution offered by ChileSoft. As standardization processes are led by Europe, foreign firms, for example Norwegian AKVAsmart and TraceTracker, have also entered the traceability system market in Chile.

Collective action also complements the IT service offered by private IT firms. “TrazaChile” was launched in July 2004 by the National Chamber of Commerce, Services and Tourism (CNC) and Fundación Chile, which is an autonomous, non-profit foundation that promotes innovation and technology transfer in areas such as agribusiness, forestry and fishing. These two institutions invested US\$ 5 million to form a corporation known as TrazaChile and to develop and operate the site.

The system is developed on the basis of ORACLE technology in cooperation with EAN-Chile. It allows for online access to historical information on exported products. The site targets producers, exporters and input suppliers, mainly in the wine, fruit, marine products and meat sectors. Following trials with three firms, the website will be fully operational as from the final quarter of 2004.

3. Case 2: Development of the software and IT service sectors

Development of the IT industry is one of Chile’s policy priorities with the advent of the information society and use of IT applications for social and economic development. The IT industry in Chile is new and still small, compared to the country’s other sectors and the same sector elsewhere, although ever since the 1960s Chile has been introducing computer languages, which were modern at that time, to produce applications mainly used in government, education and production organizations.

a) Recent conditions of the software and IT service sectors in Chile

(i) Characteristics of the IT sector in Chile

Indicators on the IT industry in Chile are scarce. The Chilean IT Companies Association (Asociación Chilena de Empresas de Tecnología de Información A.G. (ACTI)) provides time-series data on sales and the number of employees since 1989, while more detailed information on the characteristics of the sector are obtained from surveys such as Chile Innova (2003) implemented by Ministry of Economic Affairs, along with governmental institutions (CORFO, INTEC) and the Santiago Chamber of Commerce (CCS); and two surveys by the Chilean Software Firm Group (GECHS) in 2002 and 2003 that only covered its affiliate enterprises.

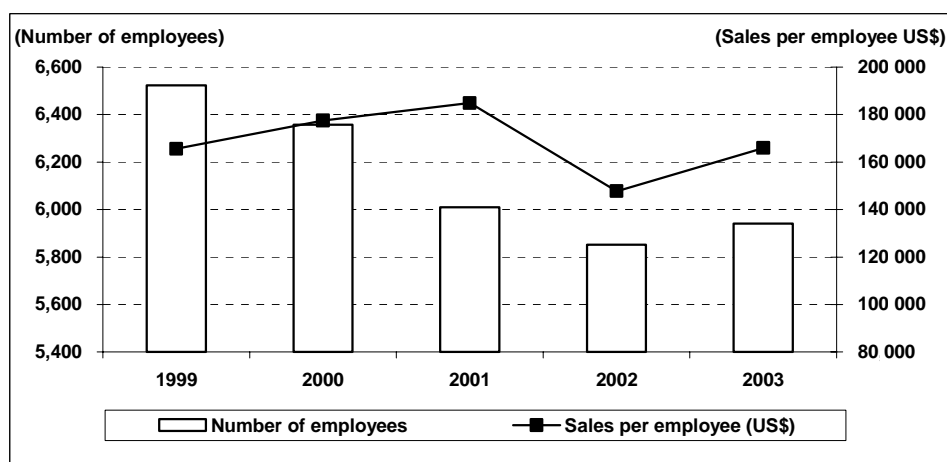
The survey conducted by Chile Innova includes the largest sample in 2002, comprising 500 IT enterprises drawn from a universe of 1,871 firms in the V, VIII and RM. In that year, 2,084 IT firms were identified. The largest IT cluster exists in the RM, consisting of 1,634 firms, followed by a 149-firm cluster in the V Region. The population includes a wide array of IT firms classified into four categories: software divided into 11 sub-sectors such as database, accounting, and e-commerce; services (13 sub-sectors such as access service; capacity building; e-commerce; telecommunications and technical support); products (eight sub-sectors including communications equipment, computers, peripherals, and parts), and others.

Most participants in the IT sector are domestic micro-enterprises (1-9 employees) and small firms (10-49 employees); 88% of them were either micro-enterprises (44%) or small firms (44%). Roughly 4.6% of their capital originated in foreign countries. The development of IT firms was encouraged during the most recent IT investment boom in the late 1990s, even though the boom was moderate compared to other IT-advanced economies such as the Republic of Korea (Ueki, 2003). About 40% of firms started up between 1995 and 1999, and 22.4% in the early 1990s. Business promotion has slowed down in the twenty-first century, and 18.3% of existing firms were participating in the market in 2000-2002.

The main activities of Chilean IT firms relate to services and software, which account for 56% and 24% of the total respectively. Using more detailed categories, 22.4% of the sample firms claimed to be involved in software and applications development and engineering. Other key activities include hardware imports and sales (16.7%), website design (13.8%), consulting on computerization and data processing (10.6%), support, maintenance, and repair of equipment (6.9%), and electric and electronic engineering (6.6%).

Smaller firms are more service-oriented, and concentrated more in the software sector than the other two categories. For micro-enterprises, website design (23.2% of the micro-enterprise category) was identified as the main activity. This percentage decreases as firm size increases: only 0.5% of the medium-sized and large firms cited this as their main activity. Small firms can provide more value added services such as software development and consulting services. The primary area for small firms was development and engineering of software and applications (26.2%), which was also important among the medium-sized and large firms. On the other hand, the larger firms offered products and services requiring more capital to supply their customers. They mainly engage in hardware imports and sales (21.0%), software and applications engineering (18.8%), consulting on computerization and data processing (12.7%), and data processing (9.4%).

FIGURE 7
NUMBER OF EMPLOYEES AND LABOUR PRODUCTIVITY



Source: Asociación Chilena de Empresas de Tecnología de Información A.G. (ACTI) <www.acti.cl>

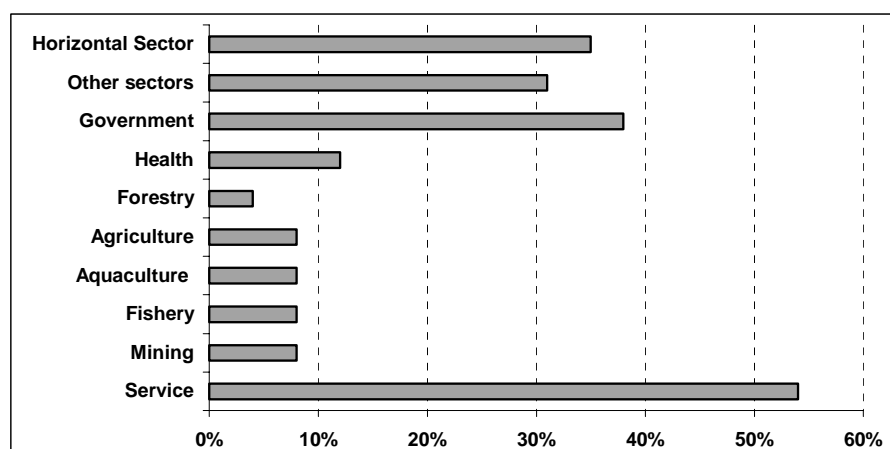
In 2001 the total sales of the sample firms amounted to Ch\$552,379 (US\$ 870) million according the survey results (Ch\$ 679,754 or US\$ 1,070 million according to the figure published by SII) (US\$ 1= Ch\$634.94, IMF). The number of workers employed by the sample firms permanently exceeded 50,000, with 68% working in medium-sized and large firms, 26% in small

firms and 7% in micro-enterprises. A further 8,400 workers were employed by the sector on a temporary basis. These figures mean that each firm employs an average of 27 permanent workers. The average number of workers was four for micro-enterprises, 16 for small firms and 153 for medium-sized and large enterprises.

The data published by ACTI indicate a standstill in the sector following the stable growth recorded up to 1998. Sales had risen from US\$ 384 million in 1990 to US\$ 1,119 million by 1998. After peaking at US\$ 1,128 million in 2000, sales then dropped to US\$ 865 million in 2002, reflecting the end of IT investment boom worldwide and deteriorating conditions in the regional economy. Sales in 2004 are not expected to regain the 1999 level. As the situation is similar in terms of the number of employees, the value of sales per employee in 2003 is broadly unchanged from the figure recorded in 1999.

The main customer segments for software firms affiliated to GECHS were medium-sized and large firms in the service and public sectors. A smaller percentage of software firms targeted export markets, such as the agriculture, fishery, forestry and mining sectors.

FIGURE 8
MAIN CUSTOMERS OF SOFTWARE FIRMS BY SECTOR



Source: “Diagnóstico 2003 de la Industria de Software y Servicios”, presentation by César Cornejo, President of GECHS, Santiago de Chile, 2003.

(ii) *Exports of software and services*

The IT firms surveyed by Chile Innova (2003) were mainly serving the domestic market, and just 17% of them declared exports. In the software sector, 12.3% of firms were exporting, particularly in the commercial software area (28.7%). In the service sector, 11.2% of firms exported services such as automation (25.7%). In the hardware segment, only 4.0% of firms registered exports, while firms selling peripherals, printing, and security equipment did not operate in the foreign market.

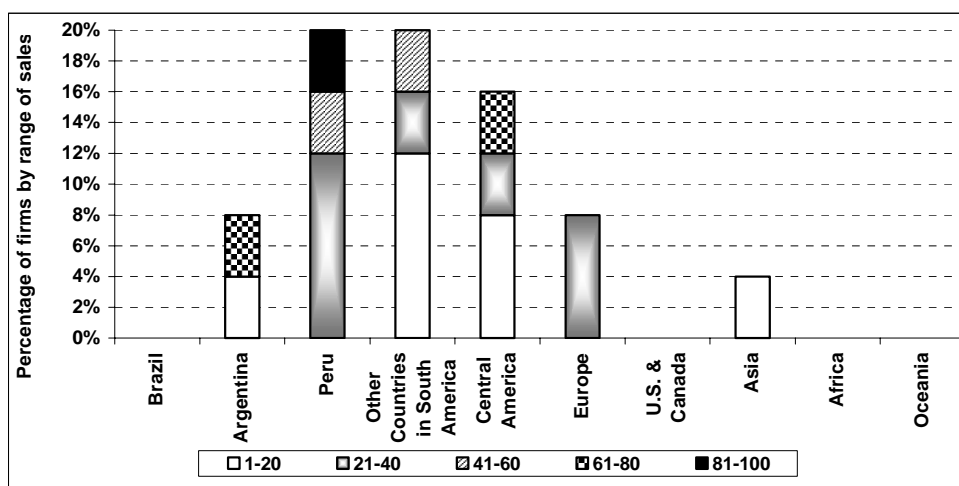
Apart from the low percentage of firms selling to foreign markets, export earnings accounted for just 3.6% of total sales. Exports were most important among small firms (5.1%), while micro-enterprises and medium-sized and large firms made 2.0% and 3.7% of their sales abroad, respectively. This seems to imply that some small firms specializing in higher value-added services have participated successfully in foreign markets.

A similar situation was noted by GECHS (2003). Total annual sales by software firms in 2003 amounted to US\$ 19,670,000 in the domestic market and US\$ 895,000 internationally (4.4% of the total); 68% of firms reported that they obtained 81-100% of their domestic sales in the RM, while over half declared no foreign sales. The export products and services that generated revenues in foreign markets were mainly packaged software (48%), software maintenance services (20%), custom-made application software (12%), and services for Enterprise Resource Planning (ERP) (12%). Exports of consulting (4%), content development (2%) and e-learning (2%) represented a small portion of sector's exports.

Reflecting current domestic and international business, software firms were interested in participating in the international market, especially in the areas of packaged applications (76%), software development (64%) and consulting services (48%); but they were less interested in the outsourcing of professionals and content development (12% respectively).

The main export destination was Peru, where 12% of the firms achieved 21-40% of their international sales. Central America and other South American countries apart from Brazil were also important markets. Apart from the South American region, some of the firms succeeded in penetrating the European market.

FIGURE 9
INTERNATIONAL SALES OF SOFTWARE FIRMS BY REGION



Source: “Diagnóstico 2003 de la Industria de Software y Servicios”, presentation by César Cornejo, President of GECHS, Santiago de Chile, 2003.

b) Comparative advantages and disadvantages

According to Chile Innova (2003), Chilean IT firms perceived that they had a competitive edge in terms of the quality of their labour force, inputs and technology. Although they also acknowledged access to financing as their weakest points, the self-evaluation of fund-raising differed between micro-enterprises/small firms and medium-sized/large firms. Smaller firms that usually face financing difficulties identified this as a weakness, whereas the larger firms saw it as a comparative advantage against their competitors in the international market.

The report also conducted a questionnaire with 49 experts chosen from different countries, in order to make a cross-country comparison on comparative advantages between Argentina, Brazil, Chile, Costa Rica and Mexico. The experts claimed that the IT industry was

becoming more competitive as a result of solid communications infrastructure, the education level of the labour force, and development of a local IT industry. In the case of Chile, the most relevant factors for competitiveness were technology use by firms, and other factors relating to IT infrastructure and education. On the other hand, the existing local IT industry and factors indicative of technological level are not seen as foundations for international competitiveness (table 11).

TABLE 11
RANKING OF THE RELEVANCE OF FACTORS BY COUNTRY

	General Ranking	Argentina	Brazil	Chile	Costa Rica	Mexico
Communications infrastructure	1	2	4	1	3	2
Development of the local IT industry	2	7	1	5	2	3
Educational level of the labour force	3	3	7	2	1	8
Use of technology in firms	4	1	2	6	6	5
Development and application of technology	5	4	3	7	4	7
Stock of computers	6	6	8	3	8	4
Total personnel dedicated to R&D	7	8	5	9	7	6
Level of human development	8	5	10	4	5	10
R&D expenditure	9	9	6	8	10	9
Geographic location	10	10	9	10	9	1

Source: “Diagnóstico de la Industria de las tecnologías de la información en Chile 2003”, Ministerio de Economía, Chile Innova, Santiago de Chile, 2003, <<http://www.innovacion.cl/>>

The key advantages that Chile requires in order to develop its IT industry include economic stability, access to the international market, and communications infrastructure. Human resources and geographic location were recognized as disadvantages. In the case of Brazil, which has one of the largest IT sectors in the region, the country has advantages in human resources, in addition to communications infrastructure and openness to international markets.

TABLE 12
ADVANTAGES FOR IT INDUSTRY DEVELOPMENT

	Argentina	Brazil	Chile	Costa Rica	Mexico
Economic stability	6.6	6.5	1.4	2.4	5.6
Openness to international markets	4.2	2.9	2.6	5.1	2.1
Communications infrastructure	2.7	2.1	3.1	6.5	3.3
Political stability	5.9	5.3	4.0	1.7	5.0
Quantity/quality of human resources	2.2	1.5	4.7	4.7	3.9
Cultural/educational level	1.3	5.1	5.2	3.1	6.5
Geographic location	5.1	4.6	7.0	4.6	1.6

Source: “Diagnóstico de la Industria de las tecnologías de la información en Chile 2003”, Ministerio de Economía, chapter 7 – Competitividad, Marcia Varela, Programa Chile Innova, Santiago de Chile, 2003, <<http://www.innovacion.cl/>>

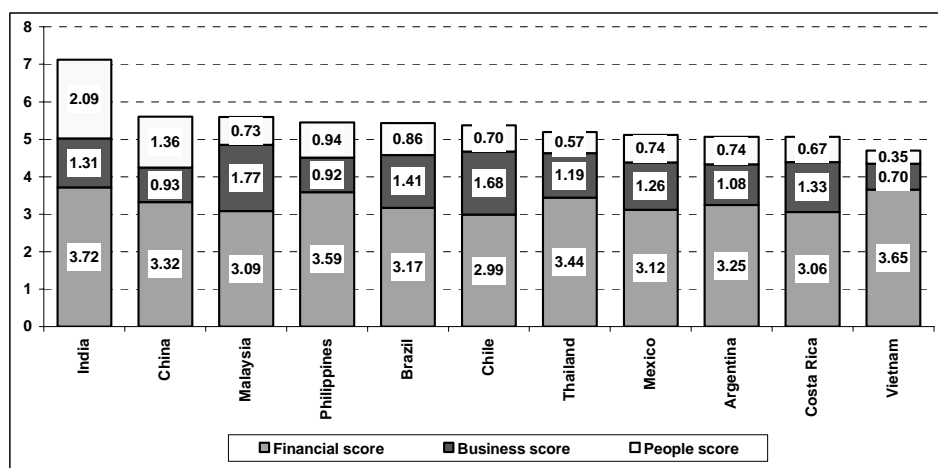
Note: Smaller figures mean better conditions.

Experts consider that the number of IT firms in Chile is still insufficient, although increasing, and that the quality of the IT industry is adequate. The main issues for the industry are

human resource training, and financing. Education and training are identified as key countermeasures. Economic stability is seen as a key competitive advantage, which is expected to have a positive impact on development of the IT industry.

The main barriers preventing IT firms from developing their businesses are access to financing and its cost; this was cited by 51.3% of the firms. Firms also identified lack of capital (33%) and access to a financing system (credit) (16%) as weaknesses. In contrast, they saw the quality of human resources and the quality of products/services as their strengths. This means that firms focus on technical and productive aspects rather than concern for their customers.

FIGURE 10
A.T. OFFSHORE LOCATION ATTRACTIVENESS INDEX FOR ASIA AND
LATIN AMERICA, 2004



Source: *Making Offshore Decisions A.T. Kearney's 2004 Offshore Location Attractiveness Index*, A.T. Kearney < <http://www.atkearney.com/main.taf?p=5,3,1,75>>

Note: The financial structure is rated on a scale of 1 to 4, and others are on a scale of 1 to 3.

The AT Kearney 2004 Offshore Location Attractiveness Index demonstrates comparative advantage/disadvantage for the IT sector in Chile, including features that are similar to other surveys. The 25 countries selected were evaluated from the three major standpoints: financial structure, people skills and availability, and business environment. Chile's score is almost equal to that of Brazil but inferior to Asian IT exporters. Although Chile can offer one of the best business environments in Asia and Latin America, its people's skill and availability is the worst in the two regions. The low valuation of the labour force is caused by less business process outsourcing (BPO) experience, small size and less availability of labour, compounded by inferior education (lower scores on standardized education and language tests). High remuneration costs, including average wages, also detracted from the assessment of the financial environment. As shown in the table below, monthly wages in Chile were higher than in Brazil; and when the devaluation in Argentina is factored in, labour costs in Chile are the highest in South America.

TABLE 13
GROSS MONTHLY WAGES IN THE SOFTWARE INDUSTRY
(In U. S. dollars)

Position	Argentina	Chile	Brazil
IT Manager	6 000	3 950	2 303
Software Development Manager	5 000	2 465	2 207
Project Leader	4 000	1 880	1 606
Systems Analyst	2 500	1 620	1 427
Advanced Programmer	2 000	1 320	921
Computer Operator	1 000	920	656

Source: “The Software Industry in Chile 2003”, A. Iglesias and R. Stevenson, Japan External Trade Organization (JETRO), 2003, based on International Data Corporation Chile (IDC), 2001.

Note: Chile: US\$ 1 = CH\$ 634.94. Average wages earned by employees in medium-sized and small business with roughly 4 years’ experience.

The barriers perceived by software firms entering the foreign market relate to marketing, product quality and internal management. In order to improve competitiveness in international markets, firms have recognized the need to strengthen capacities in terms of marketing, financing, management and infrastructure availability. Efforts to obtaining quality certifications are in an early phase; only 4% of respondents obtained the Capability Maturity Model for Software (CMM or SW-CMM) and ISO, but about 30% of them were endeavouring to achieve them. A large number of firms saw acquisition of the certificates as a medium- to long-term goal (GECHS, 2003). Even among the firms with CMM, most are large domestic and international firms; no firm achieved CMM 4 and 5. According to SPIN-Chile, KEPLER Technology S.A. is the first SME to attain the CMM.

TABLE 14
ENTRY BARRIERS TO THE INTERNATIONAL MARKET
(In percentages)

	Marketing	Legislative	Tax	Normative	Product quality	Internal Management	Subsidized products
Fundamental	28	0	4	0	12	16	0
Very important	32	16	12	8	32	32	20
Important	8	20	12	20	12	4	8
Somewhat important	0	24	28	28	8	12	16
Little important	8	8	12	12	8	12	24

Source: “Diagnóstico 2003 de la Industria de Software y Servicios”, presentation by César Cornejo, President of GECHS, Santiago de Chile, 2003.

TABLE 15
STATUS OF FIRMS IN TERMS OF OBTAINING QUALITY CERTIFICATIONS
(In percentages)

Status	CMM	ISO
Yes, in process	28	32
Yes, in the short term (1 year)	16	16
Yes, in the medium term (3 years)	16	12
Yes, in the long term (5 years)	4	0
Yes, achieved	4	4
No	12	

Source: “Diagnóstico 2003 de la Industria de Software y Servicios”, presentation by César Cornejo, President of GECHS, Santiago de Chile, 2003.

TABLE 16
CMM CERTIFIED FIRMS

No	Firm	Model	Level	Date
1	Citibank Chile	SW-CMM	2	Apr-98
2	Citibank Chile	SW-CMM	3	Oct-99
3	Motorola Chile (CCST)	SW-CMM	2	Dec-99
4	Motorola Chile (CCST)	SW-CMM	3	Jan-01
5	América XXI	SW-CMM	2	Jan-01
6	América XXI	SW-CMM	3	Sep-02
7	Altec S.A.	SW-CMM	2	Dec-02
8	Link S.A.	SW-CMM	2	Jan-03
9	Altec S.A.	SW-CMM	3	Dec-03
10	KEPLER Technology S.A.	SW-CMM	2	Dec-03
11	LAN Chile	CMM-I	2	Mar-04
12	Link S.A.	SW-CMM	3	Apr-04
13	Sonda Servicios Financieros	SW-CMM	2	Apr-04

Source: SPIN-Chile (as of July 2004) <www.spin-chile.cl>.

Based on the observations made above, the advantages and disadvantages of the IT sector and barriers to foreign market entry be summarized as follows:

- **Advantages**
 - Good macroeconomic conditions
 - Free trade agreements
 - Secure and widespread telecommunications and IT infrastructure
 - Labour force quality
- **Disadvantages**
 - Weak foundation of skilled IT engineers and the IT sector
 - Geographic location
 - High labour cost
 - Poor R&D personnel and budget
- **Barriers**
 - Financing
 - Marketing
 - Product quality/quality certifications

c) National vision and strategy for developing the software sector

The software and IT service sector in Chile is still small-scale. Although some firms have succeeded in developing high-quality products and services, the availability of qualified engineers and R&D capabilities are insufficient to turn the sector into a leading industry. Moreover, Chile does not have an outstanding labour cost advantage over its rivals in Latin America even though the best business environment is attractive to foreign investors. These observations on the current status of the IT sector suggest that its development is a long-term issue. Chile is currently implementing policies to promote the sector.

(i) *Prospectiva Chile 2010: a vision of the Chilean software industry*

The Chile Innova technological prospect programme made a study of the Chilean software industry in order to identify consensus among experts on the sector's prospects for 2010.

In the future they envisioned, Chile will have developed a good platform for telecommunications and services, and society will be using ITs intensively. The Government will lead the innovation process by introducing new applications. By 2010, the country will also have become a major service platform for Latin America, especially in the field of software and other activities linked to ITs. This platform will have been installed mainly by foreign firms, particularly financial institutions that place a high value on a good business environment. The strategic alliance between firms and Governments promoted in the software sector will make Chile attractive to the back offices of European financial institutions or other service bases such as contact, information, and solution development centres. The foundation for developing the sector will be Chile's reputation for economic stability and political and institutional consistency, rather than the technical capacity of its private sector.

This prospect will be turned into reality through the following actions:

- Alliance with developed countries such as the United States,
- Digitization of the Chilean Government,
- Improvement of English language skills,
- Reform of secondary school education,
- R&D (Establishment of R&D centres in partnership with universities and firms),
- Creation of technology parks mainly related to IT in Valparaíso, Santiago and Concepción,
- Creation of various venture capital funds and incubators for software firms,
- Exports through "Chile Inc.," a common country image for software exports,
- Promotion of exports and quality,
- International certification of university programmes.

(ii) *Initiatives to achieve IT industry take-off suggested by the Digital Action Group*

Agenda Digital 2004-2006 (GAD, 2004) is the latest medium-term plan for developing the digital economy presented in February 2004 by the Digital Action Group (GAD), an organization set up by government institutions, private firms, and the academic sector. The result of this effort is a national strategy broadly agreed upon by the public-private sector, which includes initiatives to achieve IT industry take-off for 2004-2006.

- Initiative 25: Identification of opportunities and targeting of efforts for IT industry development;
- Initiative 26: Secure quality through certification of firms (in 2005, 70% of ACTI and GECHS affiliates will have achieved certification, or be in the process of obtaining it, for software quality, such as ISO-9000 and CMM),

- Initiative 27: Intensify the programme for attracting foreign investment in high technologies
- Initiative 28: Strengthen the promotion of R&D in ICTs
- Initiative 29: Facilitate the export process in the IT industry
- Initiative 30: Funding to establish new firms.

These proposed initiatives are being implemented with strong support. The Chilean Economic Development Agency (CORFO) has established programmes such as the High Technology Investment Programme, and it grants varied financial support to promote FDI, R&D and venture businesses. The Internal Revenue Service (SII) provides tax incentives, the details of which are described in other sections of this report.

In order to facilitate the acquisition of certification, CORFO has launched a programme to support IT firms in cooperation with industrial associations and technology transfer entities such as ACTI, the Electric and Electronic Industry Association (AIE), Fundación Chile, GECHS, and SPIN-Chile. CORFO will finance 50-60% of the costs of consulting and other measures needed for IT firms to satisfy the certification criteria. As of 21 July 2004, CORFO had already provided support to 23 firms that began work to achieve ISO-9000 and CMM Level 2. The Government will support 60-80 local IT firms through the programme during 2005 (CORFO and Business News Americas, 20 July 2004).

d) Development of the software cluster in Valparaíso

Regional development is an important issue for developing countries. In Chile, CORFO promotes the TodoChile programme which aims to attract investment to Chilean regions and to encourage decentralization, taking into account existing industrial bases and comparative advantages in each region. In Chile, Valparaíso is designated as a policy priority area to develop an IT cluster with comparative advantages against over competitors. Initiatives are encouraged from local universities, national and regional governments and the private sector.

(i) Bases for development of the IT cluster

Construction of the software sector is seen as a key area at this time for industrial development at the national and regional levels. As noted above, companies in the IT sector are concentrated in Santiago, while the V Region has the second largest IT sector accommodating less than 10% of the firms. Moreover, the academic base in Valparaíso is expected to enable businesses to accept and create new technologies and firms. A number of academic institutions are also located in the area, such as Universidad Técnica Federico Santa María (UTFSM), Pontificia Universidad Católica de Valparaíso (UCV), Universidad de Playa Ancha (UPLA), and Universidad de Valparaíso (UV).

Valparaíso and its surrounding area have been identified by the Government as a potential location for IT development outside the RM. When a team from Intel Corporation, a semi-conductor manufacturer, visited Chile in 1996 to select a site for its new plant in Latin America:

“CORFO was authorized to offer incentives if the investment were to be located in an especially poor region of the country in need of economic development. CORFO officials went so far as to suggest a location for the Intel plant that would meet such criteria, a poor region of Chile not far from Valparaíso” (Nelson, 1999).

Nonetheless, the educational environment and human resources in Valparaíso are not necessarily satisfactory for establishing an IT cluster. In the V Region, there are only two doctoral programmes in science and the number of doctoral students is under 6% of the national total. The V Region’s share of PhD scholarships is less than those of the VIII and X Regions (Neely, 2003).

Postgraduate education in information and electrical engineering is concentrated mainly in UTFSM. The weakness of the R&D sector will be a bottleneck for IT sector development.

Efforts to form an IT cluster in Valparaíso have been boosted by R&D and business promotion activities in universities such as 3IE of UTFSM, and by taking the opportunities afforded by a policy suggestion by the Japan International Cooperation Agency (JICA, 2001) and Plan Valparaíso.

(a) 3IE of UTFSM

One of the flagship facilities for business development in the V Region is the International Institute for Enterprise Innovation (3IE) of UTFSM, which was founded in 2001 at the main campus of UTFSM in Valparaíso. It seeks to stimulate innovation, business promotion and development by fostering integration between the university and productive sectors.

One of the successes achieved by 3IE has been the establishment of the Motorola laboratory for mobile Internet applications in 2001. Since July 2002 the centre has evolved into an office for the Motorola Global Software Group, which is a strategic network of software centres located around the globe. Today, 3IE's Building T (*Edificio T*) is one of the central facilities in the region for businesses, universities and regional governance in the IT field.

The Institute consists of the following units: Liaison Centre; Business Incubator; Intel Laboratory; Entrepreneurship School; and Professional Training.

Of these, the Liaison Centre is a professionally staffed unit that will act as an antenna of technological businesses, stimulate collaboration and synergies between the private sector, universities and governmental institutions, and encourage the creation of enterprises and the development of higher value-added products and services.

Intel's Computer and Communications Laboratory was established by a donation from Intel Corporation in 2002, in order to provide R&D hardware platforms that are essential for training university students and strengthening local IT and non-IT companies. The laboratory undertakes development and/or precision testing on advanced hardware architecture for desktop computers, servers and network infrastructure. Students and academics in the V Region can use this equipment at no cost. Those from other regions and enterprises can also access the Laboratory, but they have to pay a fee.

(b) A policy suggestion by JICA (2001)

The JICA study team judged that most IT enterprises in Chile are categorized not as "Pure IT firms," which are knowledge-intensive, develop core software technology and export their products and services; but as "IT Solution Providers," which develop solution services from core technologies. The limited human resources and weakness in the field of IT and R&D will force the Chilean IT sector to remain in the category of "IT Solution Providers" for the next five years, as preliminary path towards the development of indigenous "Pure IT Companies."

The outlook for the IT industry in Valparaíso is similar to the present situation at the national level. The focus for IT firms in Valparaíso will be as IT solution-providers for other industries and other countries. In order to maintain and improve their competitiveness as IT solution providers, they need to maintain constant R&D for the purpose of commercialization and establishing export-oriented businesses. The JICA study team also suggested a strategy and action plans for developing the IT sector in Valparaíso, including the establishment of the IT Development Centre, the IT Special Zone, and the Science and Technology Park for R&D.

The IT Development Centre could be a self-financed non-profit organization with partners from the public and private sectors and universities. It will aim to: (i) promote

collaboration between market players; (ii) strengthen R&D by integrating CONYCIT and CORFO schemes and allocating resources from government support programmes in accordance with the R&D priorities decided by the Centre, and (iii) provide infrastructure and services for IT business, such as data centre, business support for SMEs, and other commercial services such as Internet Service Provider (ISP) and IT training.

TABLE 17
STRATEGY AND ACTIONS FOR DEVELOPING THE IT INDUSTRY IN
VALPARAÍSO, AS PROPOSED BY THE JICA STUDY TEAM

Strategy		Action plans
Vision for the future	Clarification of vision of Valparaíso as an IT city	Establish an IT Charter (declaration aimed at becoming a world-level IT city) with participation from all stakeholders
Strengthen R&D	Improve public support	<ul style="list-style-type: none"> Valparaíso Investor Relations (IR) New incentives for R&D expenditure Restructure public support programme: autonomy, localization and direction and priority under the IT Development Centre National Innovation System
	Good IT environment	<ul style="list-style-type: none"> Establishment of Science & Technology Park Improve infrastructure
	Attract MNCs (especially R&D department)	<ul style="list-style-type: none"> Establishment of a Science & Technology Park New incentives for multinational corporations (MNCs)
Foster export-oriented business	Stimulate IT companies' motivation and support	New incentives for export business
	Support IT companies' activities	Establishment of IT Development Centre
	Promotion of IT industry to overseas	<ul style="list-style-type: none"> Valparaíso Investor Relations (IR) Strategic Sister Cities
Improve IT environment and its competitiveness	Good IT environment	<ul style="list-style-type: none"> Establishment of Science & Technology Park, IT Special Zone Improve infrastructure Increase human resources supply Establishment of a specialist court for IT issues Improve living conditions Financial incentives and support
	Good human resources	Increase human resources supply
	Give support to entrepreneurs	Establishment of incubation centres
Increase in business opportunities	Demand-side approach	<ul style="list-style-type: none"> IT training by IT Development Centre E-government at provincial and municipal levels Close the digital divide
	Improve infrastructure	<ul style="list-style-type: none"> Good connection between Valparaíso and Santiago Develop broadband infrastructure

Source: “The Study for Promotion of Investments and Exports for the Balanced Economic Development in the Republic of Chile Draft Final Report”, JICA, August 2001.

The Science and Technology Park will promote collaboration between universities and firms, to achieve technology transfer to IT-based SMEs, and to serve as an incubator to support IT start-ups. The IT Special Zone aims to attract indigenous and foreign software/content firms and to achieve a critical mass for an IT cluster to form. The report assumed that the zone would

be located along the coastal area between Valparaíso and Viña del Mar. Also assumed were incentives to attract IT firms such as good facilities obtained by redeveloping old buildings, business support provided by IT Development Centre, and financial incentives.

(c) Plan Valparaíso

Plan Valparaíso (PV) is a presidential initiative that began in 2001 with the goal of repositioning the city of Valparaíso as an active and advanced metropolis. The reactivation strategy originally encompassed the following six areas: opening up of the coastal strip; city; tourism (currently the transport plan); culture; university system; and development of a high-technology hub.

The creation of the high-technology hub initially consisted of the following 12 ambitious initiatives: (i) development of a technology park; (ii) technical training and life-long education; (iii) ICT Research and Application Centre (CITIC); (iv) analysis of the potential for developing a programme for to promote investment in the V Region; (v) investment facilitation and e-government project; (vi) Valparaíso Fund; (vii) incentives to attract new firms; (viii) incubation of new firms; (ix) reduction of the digital divide; (x) improvement of city services; (xi) SMEs and IT, including a subsidy for SMEs managed by CORFO to use software services via ASP during a limited period for demonstration purposes, and (xii) improvement of telecommunications infrastructure.

A High-Technology Committee was created to implement those initiatives and foster and provide strategic guidelines for all initiatives relating to the development of an ICT cluster in Valparaíso. The committee is chaired by the Governor of the V Region with participation from the Regional Ministerial Secretary of Economic Affairs, the CORFO director for the V Region, a representative of the region's universities, the President of the Regional Chamber of Commerce, and the Director of the Valparaíso Industrialists Association (ASIVA).

Three years after formulation of the plan, the initiatives have been revised. Initiatives in the area of IT now consist of the following: (i) development of a technology park; (ii) information technology centre (ICT2); (iii) MIT-Valparaíso, a programme between MIT and Valparaíso Region to improve the productivity and competitiveness of industries in the region; (iv) creation of an investment promotion agency; (v) establishment of a Technological Innovation Fund (FIT); (vi) incentives to establish new firms; (vii) reduction of the digital divide; (viii) development of an industrial park in Quillota.

(ii) ICT Centre Valparaíso (ICT2) Project

There were difficulties in the process of formulating a project to attain the goals of the IT Development Centre mentioned by the JICA study team (2001) and the high-tech hub in Plan Valparaíso. Recently the concept has been implemented as the ICT2 project, while the original project to develop an IT Centre in Valparaíso has been renamed CITIC.

(a) CITIC

Following the JICA study (2001), the ICT Research and Application Centre (CITIC) project was planned to establish a national and international reference centre for R&D in IT products and services.

According to the CITIC project plan, its mission is to be a high technology centre in the ICT field specializing in the following: research, development and customization of products; human resources training; knowledge transfer; coordination of university-governmental initiatives aimed at transforming innovation into commercial value; and technology transfer to Latin America. The Centre is also expected to strengthen and develop the ICT sector in the Valparaíso

Region, turning it into a national reference centre in the short-term and a reference centre for Latin America in the ICT field in the medium-term.

The project was expected to be financed by the V Region and CONICYT (National Scientific and Technological Research Commission). A contribution from the Government of Japan through JICA was also expected for the following activities: participation of long-term and short-term Japanese experts in the planned R&D activities; human resource training including internships for young CITIC researchers⁷ in Japanese universities.

(b) ICT2

Although the concept of the CITIC is being developed through intensive collaboration by the Government, universities, and JICA, the first project proposal failed to be endorsed in 2002. Attempts to revise the proposal were continued.

Politically speaking, the development of IT Centre has been promoted as one of the key areas for international cooperation between Japan and Chile. The CITIC project was mentioned by Japan's Prime Minister, Junichiro Koizumi, when he and President Ricardo Lagos of Chile held a summit meeting in Tokyo on 14 February 2003. Prime Minister Koizumi announced that Japan would extend support to CITIC in Valparaíso. He expressed the hope that the centre would contribute to the dissemination of IT not only in Chile but also in the other countries of Latin America, and that Chile would become the IT hub of the Latin American region. The summit meeting gave a boost to the project.

During the process of revising the project, two major changes were made to the original framework. Firstly, CONICYT took over responsibility for the project, although CORFO and its relevant body, the Technological Research Corporation (INTEC), had played a leading role in developing the initial proposal. Secondly, efforts were made to find the priority area for R&D at the Centre. In order to develop the project, in 2003 CONICYT issued a public call for proposals for an "Advanced Centre in Information and Communication Technology in Valparaíso". Universities mainly from the V Region organized a joint venture to submit a second proposal entitled "ICT2." This process was approved in 2004 following a few revisions.

As of 2004, the status of the ICT2 project can be summarized as follows:

- Financial contribution:
Regional Government in the V Region CONICYT/FONDEF (Fund for Scientific and Technological Development)
- International assistance:
Japan International Cooperation Agency (JICA)
- Universities:
UTFSM, Universidad de Chile, Universidad de Católica de Valparaíso, Universidad de Valparaíso, Universidad de Playa Ancha, Universidad de Viña del Mar, and Universidad de Mar.

The project will be financed by the national and regional governments of Chile and the private and academic sectors in the region. The Government of the Valparaíso Region and CONICYT will provide CH\$ 200 million in funding annually over a five-year period (up to CH\$ 2 billion in total during the five years following the project's launch). As CONICYT required applicants to prepare budget plans to which the private sector would contribute at least 20% of the total project budget, the universities and associations are expected to make investments of about CH\$ 666 million.

In addition, JICA is planning to provide the required inputs, mainly by sending experts and training Chilean experts in Japan, intensively during the first two phases of the project. If the project is unable to achieve the expected result, JICA will not provide further assistance to the Centre.

The Centre's goals are to strengthen and develop an industrial cluster that enables Chile to research and develop IT products and services. The Centre also aims to become a reference centre in the field of applied technologies with an international outlook. Under these general objectives, ICT2 sets more specific objectives as follows:

- Research for export industries.
- Transfer of new technologies to the local IT industry.
- Development of knowledge with potential economic value (patents for invention).
- Development of a key R&D centre for the industrial cluster in the V Region.
- Establishment of a body for cooperation between IT companies and universities in the R&D field.
- Technology transfer to universities with participation by professors and students.

From this perspective, the main issue relating to development of the Centre is to encourage collaboration between the academic and business sectors. Closer relations between them will enable them to promote technology transfer from universities to the corporate sector, to improve the competitiveness of existing businesses and establish a favorable environment for starting up new ones. It will also strengthen the foundations of R&D and human resources in Chile and in the V Region particularly.

In order to bring the initiative to fruition, efforts were needed to clearly identify the area for R&D on which most emphasis should be placed. Although one of the candidates was the mining sector, this was ruled out because it is dominated by large firms and the IT-related market for the sector is dominated by large IT providers.

As a result of the revisions to the proposal, traceability was identified as an area in which Chile may potentially have a comparative advantage, the beneficiaries being mainly SMEs. For the first two years after its launch the centre will focus on R&D and product development in the field of traceability, such as embedded system and Radio Frequency Identification (RFID), although R&D is expected to become more sharply focused after a director has been recruited for the centre. In order to facilitate the project, JICA will seek support from Auto-ID Labs Japan, and it plans to hold the initial training at Auto-ID Labs Japan, and to dispatch short-term specialists from the Labs during fiscal 2005.

The centre will consist of 20-30 researchers. The ICT2 project will be operated at 3IE of UTFSM at first, before relocating to the Technological Building in Valparaíso after mid-2005.

This building is being constructed by CORFO in the Curauma Industrial Park located 12 km from Valparaíso along Route 68. Construction will be completed in April 2005. CORFO appears to see the building as a base for encouraging IT businesses, and to meet the prospective increase in demand for spaces by high-tech companies that will be attracted to the V Region by CORFO's High Technology Investment Programme.

C. Problems for SMEs participating in the trade-oriented value-chain

The data and cases described above clearly show the conditions and problems faced by Chile's small- and medium-sized exporters (SMEXs). In both the manufacturing and the IT sector, their

direct exports are marginal with destinations limited to the Latin American region. Nonetheless, some SMEs contribute indirectly to Chilean exports by participating in value chains producing exported products. There are also SMEs in the local IT sector and other service sectors exporting their products and services either directly or indirectly.

Lack of human resources and management and financing capabilities are still key issues for SMEs. From more detailed observations on SMEs, weaknesses were recognized in quality management, information management, and marketing and sales. They are also short on abilities in planning and inventory management for production and operation, and in financial administration and cost analysis for financing. As a result there is insufficient IT usage by SMEs since most of their problems can be addressed by using IT effectively. This lack of technology receptiveness among SMEs is one of the factors preventing development of the local IT sector. In addition the heavy burdens imposed by transport costs erode price competitiveness in distant markets.

As IT can be applied to the problems faced by product exporters, the need for software development along with IT service firms and qualified specialists in the IT field will become medium-to-long-term policy issues. In general, well-coordinated policies for promoting new businesses are essential in order to establish a mechanism to improve competitiveness and to enhance national economic vitality. Nonetheless, the Chilean strategy for developing an IT cluster started late in comparison with Asia and certain other countries in Latin America, so the country needs to accelerate activities to create a new IT cluster. Technology transfer from developed countries such as Japan will promote IT industry development and is expected to turn Chile into a base for technology transfer to other countries in Latin America.

Although Chilean SMEs have not always succeeded in participating in foreign markets, more firms participate in international supply chains for food-related manufactured products, which are one of Chile's main export categories. In order to respond to the increasingly stringent requirements for safer foods by consumers in the export market, it is becoming a prerequisite for the Chilean SMEs to establish a secure quality control and management system, and obtain internationally compatible certifications wherever possible. This is true both in IT and in other service sectors.

In case of the food traceability systems, the relevant business associations in the food-related sectors take the following approach in cooperation with governmental bodies:

- (i) Negotiation of agreements with the Government, introduction of regulations, or establishment of internationally-acceptable national standards making it possible to record and store information and data necessary to build traceability systems;
- (ii) Collaboration with experts for technology transfer and SME capacity building;
- (iii) Introduction of international standards on data-coding to create electronic traceability systems;
- (iv) Provision of IT services that can be developed in accordance with data-coding standards by both private firms and industrial associations.

III. Government policies designed for SMEs, IT, and international trade

Government policies for economic and IT development are formulated and implemented in partnership with the private sector. This strong public-private partnership is one of the most distinctive aspects of development policy. On the Government side, the Chilean Economic Development Agency (CORFO) is one of the key execution agencies for industrial development, while the Chilean Export Promotion Bureau (*Dirección de Promoción de Exportaciones* (PROCHILE)) is in charge of export promotion. On the private-sector side, business organizations and private firms, especially the Santiago Chamber of Commerce (CCS) and Federation of Chilean Industry (SOFOFA), participate in processes of policy formulation and implementation. In case of IT policies, the Chilean Association of Information Technology Enterprises (ACIT) is playing a key role and has a major influence in policy formulation. For this reason, not only the government sector but also the private sector should be taken into consideration when designing the IT policy framework.

A. IT policies in the country's overall development strategy

Chile's IT strategies are built on two pillars. One of these has a time dimension; its medium-term IT strategies and policy measures have in mind the bicentennial of its founding as a nation in 2010. The other pillar relates to policy objectives: IT promotion is seen as a policy for promoting economic development.

1. Pro-growth program

The importance of IT and international trade to economic development policy can be recognized from the Pro-Growth Program (Agenda Pro Crecimiento – Ministerio de Hacienda), which was designed through collaboration between the Government of Chile and SOFOFA in 2002 for the purpose of identifying opportunities to promote and increase potential economic growth. The following eight areas were identified as main themes: regulatory amendments to favour competitiveness; technology policy; tax structure; capital market; efficiency in public expenditure; labour issues; simplification of procedures; and export promotion. These include IT

related issues such as: modernization of regulations in the telecommunications sector; the electronic signature law; electronic invoicing; law on public procurement; and a tax mechanism to encourage FDI by foreign firms from Chile to other Latin American countries and to promote IT service exports.

A number of projects and related bills in line with the program have been studied and executed, or submitted to parliament. Following the first phase of the program in October 2003, the remaining challenges for promoting economic growth were transferred to Agenda Pro Crecimiento II. The key areas for sustainable development listed in the new agenda are as follows:

- **Export Development:**
A public-private council was established to address new challenges and opportunities arising from free trade agreements (FTAs).
- **Education:**
Reform of the education system, etc.
- **Technology development: the measures needed are:**
 - (i) Better use of public resources for R&D;
 - (ii) Establishment of mechanism allowing for greater linkages between productive firms, R&D centres and universities;
 - (iii) Expansion of the broadband network;
 - (iv) Expansion of the use of IT in the productive sectors, and so forth.
- **Efficiency of governance:**
Electronic government, etc.
- **Productive chain:**
SME participation in export supply chains.

The programme envisages SMEs increasing their productivity through greater connectivity with the digital network, and by thoroughly incorporating IT into their processes. Only after fulfilling these conditions can SMEs participate in the supply chains established by large firms and benefit from the opportunities offered by FTAs. For this purpose, it is essential to establish closer links between large firms and SMEs and develop well-educated labour forces. Successful implementation of these challenges will also lead to regional development.

2. The Presidential Commission Report in 1999

Chile's current IT policy inherits the achievements of the Presidential Commission Report published in 1999. The Presidential Commission on New Information and Communication Technologies was organized in 1998 during the administration of President Eduardo Frei. The Commission assembled four working groups, consisting of over 100 people, to study the following issues: (a) applicable commercial legislation and regulations; (b) use of IT for productive and technological development; (c) use of IT in modernization of the State; and (d) issues relating to equity and cultural development.

The Commission identified the transformation caused by IT as embracing enterprises in all economic sectors, people throughout Chilean society, and the State, and leading to the emergence of an "Information Society." It also recognized four areas of challenge for Chile to develop the information society: (i) a highly unequal geographic and social distribution of information infrastructure; (ii) a major contrast between rapid computerization of firms and their slow integration into information networks; (iii) an disorganized and haphazard process for computerization of the public sector; and (iv) significant weaknesses in the quality and variety of domestic content on the Internet.

This report suggested both a long-term strategy and a short-term action plan for 1999-2000. It also included a total of 61 guidelines and action proposals.

a) Strategies for building an information infrastructure

The long-term strategy with a view to the bicentenary of Chile's independence in 2010 aimed to provide all Chileans with access to digital information networks at home, at school, at work, in the community, or in public places and institutions. The report identified key measures for the strategy's success:

- (i) A flexible and harmonious regulatory framework for the information and communications industries, in order to promote competition and transparency and to allow for expansion of the digital information services market;
- (ii) A new legal framework to establish rules and procedures for the validation of digital documents and signatures, which will provide a basis for e-commerce and electronic information exchange, thus allowing the development of direct and indirect electronic markets for goods and services;
- (iii) More rapid progress in computerization of the State, through the construction of a government information highway integrated with the Internet, which will promote computerization among businesses and encourage them to connect to information networks;
- (iv) A policy of universal access at a reasonable cost, particularly targeting rural areas and low-income groups;
- (v) A policy for developing the content and value-added service industries;
- (vi) A policy for encouraging learning and access to new knowledge, in order to create a world-class labour force, by means of school information networks, and the promotion of e-learning to provide training and continuing education to employees and professionals.

b) Initiatives to be launched in 1999

The short-term action plan for the 1999-2000 periods aimed at the construction of information infrastructure. The belief was that improved IT infrastructure would enable Chile to accelerate its progress toward the information and knowledge society in the first decade of the twenty-first century. The Presidential Commission proposed the following twelve initiatives:

- (i) Complete implementation of the Enlaces school network programme, and launch of a second phase extending it to every school in Chile, while strengthening teacher training and content development;
- (ii) Promote scientific and technological development by encouraging all Chilean universities and research institutes to join the Reuna2 high-speed network;
- (iii) Implement a National Programme for Information Kiosks and Community Internet Telecentres, with the aim of providing all communities with these public access mechanisms by 2006;
- (iv) Promote the development of a legal framework for validation of digital documents and signatures, both for government use and to support e-commerce;
- (v) Expedite the passage and implementation of the Personal Information Protection Law to safeguard individual rights;
- (vi) Update the regulatory framework applicable to Internet and related services in Chile, in order to bring down access costs through greater market transparency and competitiveness;

- (vii) Initiate a second phase in the development of a National Health Information Network to help provide higher-quality health care to all Chileans;
- (viii) Establish national information and communication systems training network to support the development of a world-class labour force;
- (ix) Encourage further expansion of the electronic services provided by the State in areas such as taxation and customs, thus simplifying procedures for individuals and businesses;
- (x) Enhance the public sector's computerized contract and procurement system, leading to more competitive markets, greater transparency and higher savings;
- (xi) Develop a government intranet, and ensure that high-quality public information is available to all Chileans over the Internet;
- (xii) Create a multidisciplinary task force to spearhead the country's efforts to become an information society.

The result of the initiatives proposed by the Commission is listed in the table below.

TABLE 18
IMPLEMENTATION OF THE INITIATIVES ASSUMED IN 1999

Initiative	Situation in October 2003
Red Enlaces (School Internet Initiative), and training of teachers	8,000 establishments have PCs, 4,700 connected to the Internet. 85% of teachers have attended training, and 80% of them have PCs in their homes.
REUNA II (High-speed Internet connection for universities and research institutions)	155 Mbps ATM network constructed from Iquique to Valdivia, connecting to 14 universities. All universities and research centres from Arica to Magallanes have broadband Internet.
Network of Infocentres	1,300 infocentres exist in 317 towns, 368 public libraries with Internet access, 500 establishments for Red Enlaces opened to the community and others for micro-enterprises, adolescents, senior citizens, and the community.
Law on electronic signature	Law promulgated in 2002.
Law on private life protection	Law promulgated in 1999.
Reduction of Internet access costs	Access costs were reduced in 1999 by substituting local call rates (SLM) for significantly cheaper access charges. This led to a significant increase in connectivity.
Digital training network	Companies, technical training institutes (OTECs), intermediate technical training organizations (OTICs) and municipal offices for labour intermediation (OMILs) can carry out all their procedures via Internet. The payment method will soon be complete thanks to an agreement between the National Training and Employment Service (<i>Servicio Nacional de Capacitación y Empleo</i> (SENCE)), the Treasury, and the Chilean Internal Revenue Service (SII).
Electronic services of the Internal Revenue Service (SII) and Customs Authority	SII diversified its services and made them widely available, and is now promoting electronic invoices and fee billing. The Customs Authority has switched from electronic data interchange to Internet.
Electronic public procurement	Started in 2003. Public Procurement Act promulgated (Law 19.886). As of October 2003, 78% of government procurements channelled through ChileCompra. 48,000 suppliers are registered in the system, and 29,000 of them make bids through it.
Government intranet	As of September 2003, the Government Intranet is connected to 27,448 workstations and 46 web servers. The network links 27 entities, including all of the ministries and six highly demanded public services.

Source: Agenda Digital 2004-2006.

3. Agenda Digital 2004-2006

The initiatives proposed by the Presidential Commission Report achieved positive results for the development of a digital economy. Nonetheless the following six issues remain unresolved: (a) the digital divide and low penetration of broadband Internet; (b) inadequate human resources in terms of both quantity and quality; (c) inequality in the development of e-government; (d) weak access and use of IT among enterprises; (e) scant development of the IT industry; and (f) incomplete and incoherent legal-regulatory framework. A new IT strategy has been designed to overcome these difficulties.

Agenda Digital 2004-2006 (Grupo de Acción Digital, 2004) is the latest medium-term plan for developing the digital economy. Drafting began in April 2003 and was presented in February 2004 by the GAD, which was organized by government institutions, private firms, the academic sector and other governmental institutions. The result of this endeavour is a national strategy enjoying broad consensus among the public-private sector, with a view to the bicentenary celebration in 2010, and including an action plan for 2004-2006 that contains 34 initiatives. The program also incorporates the principles established in the United Nations' first World Summit on the Information Society (WSIS) held in Geneva on 10-12 December 2003.

a) The goal of the agenda for the 2010 bicentenary

Agenda Digital proposes that Chile will be a digitally developed country, ranked at the level of OECD member States, by the time of the bicentenary. This means that:

- It will be equipped with solid and secure broadband infrastructure; available nationwide and accessible to all people from their homes, work places, or a network of infocentres and cyber cafés.
- It will have digitally literate population and a workforce with skills for better IT usage.
- It will provide online services for the citizen, with Government, congress, the judiciary, and both regional and municipal authorities all contributing to digital development from their different perspectives.
- it will expand enterprise connectivity to the network, or intensify advanced use of the Internet in businesses, including highly developed electronic commerce.
- It will attain a critical mass of IT firms capable of competing internationally.
- It will be equipped with a modern legal-regulatory framework that facilitates development of the information society, assuring freedom of expression, democracy, transparency, and access to knowledge and culture, such as protection of the rights of creators, innovators, entrepreneurs, employees and consumers.

b) Action plan for 2004-2006

In order to accomplish the six objectives for 2010, an action plan was developed. Agenda Digital 2004-2006 includes 34 initiatives, which can be grouped into six action areas: (i) access; (ii) education and training; (iii) e-government; (iv) computerization of firms; and (v) IT industry, and (vi) legal-regulatory framework.

In short, the main objective of the action plan for 2004-2006 is to double the level of Internet connectivity among people and firms by 2006, for which purpose, the prime focus is on stimulating demand for Internet applications. These initiatives prioritize seven medium-term goals, with numerical targets, as listed below:

- Consolidation of the national network of infocentres and cyber cafés, through which millions of Chilean people will be able to access the Internet.
- 900,000 households connected through the Internet.
- At least 1 million people attending IT courses.
- Popularization of electronic procedures and extension of IT use to local *municipios* and all government institutions.
- Promotion of connectivity and advanced Internet use by 150,000 firms.
- Achievement of a critical mass of IT firms.
- Enactment of legislation for the information society and digital economy.

c) Initiatives in 2004-2006 (GAD, 2004)

(i) Widely available access

- Consolidation of the means to facilitate individual and community broadband access for all Chileans.
- Promotion of Infocentres as service centres.
- 900,000 households and 150,000 businesses connected to the Internet by 2006.

(ii) Education and training

- Digital literacy for half a million Chileans.
- Launching of IT skills certification.
- Promotion of connected and equipped schools.
- Integration of IT into curricula.
- Fostering technical/professional IT training.
- Promotion of world-class content.
- Command of basic and instrumental English for all schools.

(iii) Online government

- Integrated electronic services platform.
- Broadband digital network for the public sector (Ruta 5D).
- Electronic platform for ChileSolidario and social policies.
- Development of digital technologies in the health sector.
- Digital development of regional governments and municipalities.
- Increase in the measurement and efficiency of government information technology spending.
- Improvement of the security of essential information structures for the public sector.

(iv) Digital development for businesses

- Widespread use of electronic invoicing.
- Consolidation and expansion of the use of ChileCompra.
- Simplification and online installation of business transactions.
- Electronic billing for fees and online initiation of activities.
- Development of payment means for e-commerce and consolidation of the Government's payment portal.
- Single window and marketplace for international trade.
- Increased adoption of development instruments.

(v) IT industry take-off

- Identification of opportunities and focusing of efforts for the development of the IT industry.
- Quality assurance through company certification.
- Intensification of the High-Tech Foreign Investment Attraction Programme.
- Heightened promotion of IT Research and Development.
- Facilitation of the IT industry exports process.
- Financing for enterprise creation and start-up.

(vi) Legal framework

- Removal of obstacles and promotion of electronic document and electronic signature.
- Right of execution of e-invoicing.
- E-commerce consumer rights.
- Upgrading of legislation to protect intellectual property.

B. Policies to support SMEs

At least six ministries with their agencies (Agriculture, Economy, Education, Finance, Foreign Affairs, Labour) are involved in SME policy in conjunction with the private sector. As over 100 instruments have been introduced for SME development, according to Berry (2002), it is therefore redundant to explain the entire framework of SME development policy.

This report focuses on IT policies; export promotion, and business development. Two government institutions play key roles in this field. PROCHILE contributes to diversifying exports of Chilean products and services, provides export sectors with information, and supports Chilean firms in their contacts with potential purchasers abroad. CORFO is in charge of financial instruments for economic development.

Although SMEs can access most policy instruments, which partly target SMEs, some instruments were not fully exploited by SMEs, or else were introduced for application mainly to SMEs whose definition was not necessarily consistent between implementing agencies (Berry, 2002).

1. Export promotion

PROCHILE has a policy package to expand and enforce the Chilean exporter base. The institution provides various support services to firms with potential and existing exports according to their development stages. The menu of services offered by PROCHILE is listed below.

The Government of Chile also provides export incentives. One of the policy instruments consists of tax incentives that can be applied by exporters regardless of business size. The other consists of credit instruments.

a) Tax Incentives

- Custom duty and tax refunds to exporters:
The reimbursement of custom duties and taxes paid on imported raw materials and used as inputs in the production of goods destined for export.
- Custom duties deferred payment, fiscal loans and other benefits:
Deferred payment system for customs duties on imports of certain capital goods. A fiscal loan for the buyer of capital goods that will not be used in Chile. This loan can be paid as the merchandise produced is exported with such goods.

- Tax return to exporters:
The right to recover VAT paid on goods or services shipped abroad.
- Private export warehouses:
A special modality allowing for the storage of imported inputs to be used to generate export products. Foreign inputs enter such areas without paying taxes or VAT.

b) Financial Instruments

- Coverage for Bank Loan to Exporters
(Crédito CORFO Exportación, Cobertura de Préstamos Bancarios a Exportadores, Cobex):
Cobex supports sales to foreign countries by Chilean enterprises, by extending bank financing to exporters. CORFO covers default risk on loans granted by banks to medium- and small-scale Chilean exporters.
- Export Credit (Crédito CORFO Exportación):
This credit allows Chilean enterprises to finance their export resource requirements and to extend finance to their foreign purchasers through medium- and long-term credits granted by commercial banks with CORFO funds.
- Small Business Guarantee Fund (FOGAPE):
FOGAPE is a State fund, managed by the State-owned bank BancoEstado. It is designed to guarantee a certain percentage of the capital loans that financial institutions extend to small firms that cannot finance working capital and/or investment in projects from financial institutions. Enterprises eligible to apply for the fund include small firms and exporters with annual foreign sales of US\$16,700,000 FOB or less in the previous two years.

The export promotion policy and instruments referred to here do not necessarily target IT products and services alone. The promotion of IT exports forms part of the policy for FDI promotion and high-tech industry development, which will be discussed below. Nonetheless, the export sector and government institutions are using IT as a tool to promote and facilitate exports from Chile. Experiments for IT application can be identified from PROCHILE's service:

- *Fonoexport*:
Telephone service to make the first contact with a PROCHILE expert.
- *Cyberexport*:
Information centre for exporters located in Santiago and Concepción, where PC, Internet, and other IT equipment are situated.
- *Video Negocios*:
Video conferencing system connected to cities where PROCHILE has offices.
- *Marketplace*:
Chileinfo.com provides e-marketplace services to registered exporters who can make business offers, buyers who can search for products and providers, along with other relevant information.

TABLE 19
SERVICES TO EXPORTERS PROVIDED BY PROCHILE

Potential exporter	→	Preparation to be an exporter		←	Exporter
General information	Capability development	Consultant service	Marketing service	Assistance in the market	
Faqs	Consultant Platform	Consultant service	Market information	Market opportunities	
Test of exporter	Training to Exporters	Sector plan for export promotion	Tariff	Contacts	
Www.prochile.cl	Interpyme Programme	Company plan for export promotion	Statistics	Preparation of agendas	
Fono export (2,676 5,700)	Interpac Programme	Certification and environment	Market profiles	Video business	
PROCHILE in Regions			Study on product-market access	International fair	
Exporter step by step (<i>Paso a Paso</i>)			Study on product-market potential	Missions and events	
Virtual library			Study on market	Solution of problems	
Cyberexport			Guide for exporter	Marketplace business centre	

Source: PROCHILE <www.prochile.cl>

2. Trade facilitation

The concept of trade facilitation is not always well defined but generally encompasses a broad range of attempts to make trade easier. Staples (1998) included the following as issues relating to trade facilitation:

- Physical infrastructure: improving roads, upgrading port facilities, airports and transport infrastructure in general;
- Non-tariff barriers (NTBs) and all forms of regulatory asymmetry, including standards;
- Tariff negotiations, services and investments/intellectual property measures;
- Trade promotion: The best way to fully exploit trading opportunities.

From the trader's perspective, trade facilitation relates to the entire trade chain encompassing order/preparation, transport, customs and payment handled by both the private and the public sectors (National Board of Trade of Sweden, 2003). Trade facilitation requires reform of the institutional framework for simplification, standardization and uniformity of procedures throughout the trade chain. Implementation of the reform will be made feasible or more efficient by effective use of standardized technologies such as computers, telecommunications, IT solutions, payment systems and standardized transport systems.

From the Chilean standpoint, the country has the most sophisticated physical infrastructures in Latin America. For example, Santiago won high marks for its airport service, in addition to low cost of living and security.

In the case of tariff negotiation, Chile has promoted both Economic Complementation Agreements (ECAs) and Free Trade Agreements (FTAs). The country has already negotiated

ECAs with six countries and Mercosur, and FTAs with seven countries and regions including the United States, the European Union, and Korea, while lowering the general tariff to 6 per cent in 2003. As a result, Chile's tariff schedule is not necessarily uniform and easily comprehensible. Customs duties faced by importers of Chilean products depend on the provisions of the tariff reduction schedule in each agreement.

For the purpose of trade facilitation, the public and private sectors in Chile have introduced IT systems for each sector under the Public-Private Partnership framework.

a) Tariffs:

CCS and PROCHILE are building a Tariffs website entitled *Aranceles*, which contains a database of trade agreements. Users can search for information such as tariff codes, tariff reduction schedules, rules of origin and the chapters of each agreement, which are associated with tariff codes.

b) Certification of origin:

The Federation of Chilean Industry (SOFOFA), the main private certifying agency, has streamlined the certification process to the point where it is now fully computerized (Izam, 2003). It also offers procedures for certification of origin via the Internet.

c) Trade EDI:

Edi-Trade is a representative Trade EDI provider in Chile, founded by the Chilean Chamber of Customs and others. Its EDI system began to transmit data to the National Customs Service in February 1997; and it owns over 80% of the EDI transmission market for customs agents (see Edi-Trade website). The company is expanding its product lines along the trade chain:

- *Sistema Integrado de Gestión Aduanera (SIGAD)*): Customs agency platform developed by the firm.
- Consolidated Chilean Customs Duty: Database and analysis tools on tariffs, including FTAs with the European Union, Korea and the United States.
- *Movimiento Marítimo Portuario*: System for planning embargos.
- *Sistema de Acceso a Estadísticas y Tarifa Arancelaria (SAETA)*: Database on trade and tariff data.
- Electronic invoicing: Integration of the firm's system with an electronic invoice system, and the e-government system of the Internal Revenue Service (Servicio de Impuestos Internos (SII)).

d) Customs:

The National Customs Service is implementing a project to integrate Internet systems for the development of customs operations and regulations (ISIDORA). This will introduce XML and web technologies to modernize customs information systems, and will integrate the information systems of the National Customs Service, improve inspection processes and simplify and standardize processes generally. As a result, it will become possible to transmit to the National Customs Service all data relating to export, import and transit of goods, and make payments electronically. The customs authority has uploaded or is preparing specifications of

manifests for air, maritime and land transportation, including by courier, along with declarations for international transit, entry, and departure.

e) Port logistics:

Logistics is one of the most promising fields for obtaining benefits from IT. In the case of port management, the Port of Valparaíso, for example, has introduced online services for logistics and shipping planning. Its logistics service is provided by Valparaíso Logistic Trade (VLT), which is a strategic partnership between the Port Valparaíso, the Association of Fresh Fruit Exporters (Asociación de Exportadores de Chile AG (ASOEX)), Rutacert (a logistics information service provider), and TPS (Terminal Pacifico Sur Valparaíso). The VLT website serves as a portal for port logistics in Valparaíso. Users can monitor movements of vehicles through the Rutacert system. They can also trace cargos in the port and make plans to dispatch trucks to the port. This means they can cut truck-waiting time in the port, and thus help reduce traffic jams in Valparaíso.

f) Online service (CCS):

The Santiago Chamber of Commerce (CCS) has developed online services that represent information infrastructure for international trade:

- Comex online: Database on international trade.
- E-Certchile: Digital Certificate Authority.
- Movimiento Marítimo Aéreo: Publication of the itinerary of maritime and air cargos operated by the leading firms in Chile, to assist shipment planning.
- Rutacert: Vehicle monitoring system that enables users to access positional information certified by CCS and to improve fleet dispatch control (rutacert.cl).

g) Portal Comex online CCS:

This CCS portal site mainly provides its subscribers and members with information and services relating to the foreign trade library; database access services; support services; and international business (<http://www.portalcomexccs.cl/>).

- Library: guidance for implementing international trade operations; foreign trade regularized by the Central Bank of Chile and the Chilean Customs Authority; international commercial agreements; conditions for service exports to the United State; full texts of foreign trade surveys.
- Database Access Services: Chilean import/export duties; Comex online; directory of importers/exporters; and others.
- Support services: sea and air traffic itineraries; directory of trade-related services; information on the commercial and financial performance of Chilean firms; information on foreign trade training courses and their timetables established by the CCS business school, and online registration.
- International Business: search for national and international business partners taking advantage of the network of accords signed by CCS; assistance to CCS members of visiting trade missions; International Business Certificate (IBC), including the commercial, legal and financial background of a firm; a presentation on Chile in Spanish, English, French and German; and Chile-Central America Forum providing information such as trade agreements, statistics on Central America, and so forth.

3. FDI promotion

The Foreign Investment Committee (Comité de Inversiones Extranjeras) handles FDI promotion, while the Internal Revenue Service (SII) has jurisdiction over the tax incentives and the main policy instruments, and CORFO promotes the development of SMEs and the high-tech industry. Under this institutional framework, the Government of Chile encourages FDI in three main ways: (a) promoting development in regions, (b) encouraging FDI to use the country as a platform for investing in other Latin American countries and (c) developing the IT and service industries. The initiatives do not necessarily target foreign SMEs.

a) **The *TodoChile* programme**

TodoChile is a CORFO programme to attract investments to Chile's regions and encourage decentralization. The programme provides a number of additional incentives for investment outside Santiago, depending on the project stage: feasibility study; financing; operation; export; and expansion.

b) **High-Technology Investment programme**

In 2000 CORFO introduced a programme of special incentives for investments in high-technology projects, targeting those in which foreign companies act either individually or in a consortium. Projects have to comply with two basic requirements: (i) they develop new projects in high technology; and (ii) they must involve investments of at least US\$ 1 million.

The program targets sectors that support the development of or use new technologies, such as: (a) software production; (b) production of equipment and components for information processing and transmission; (c) IT enabled services; (d) production and dissemination of multimedia content; (e) biotechnology and pharmaceutical products; and (f) production of new materials.

The programme provides the following incentives (Comité de Inversiones Extranjeras, 2004):

- Co-financing of pre-investment studies, such as pre-feasibility and feasibility, environmental impact, soils, architecture and engineering.
- Grants for investments in fixed assets, such as acquisition of land and buildings, and for urbanization, infrastructure and technological equipment.
- Grants for the development of human resources, including workforce training.
- Incentives for the project promoter or manager, which encourage the promotion and implementation of high-tech investment projects in Chile.
- Grants for R&D in projects of high commercial impact.

c) **Regional Investment Platform**

This initiative aims to make Chile the main regional business centre for multinational companies operating in Latin America, by encouraging foreign investors who are attracted by Chile's stability and business environment to use the country as a base from which to export or provide services to other Latin American markets. As IT might be the means used to operate foreign affiliates or provide high value-added services, the initiative is complemented by the High Technology Investment Programme.

For this purpose and in accordance with Agenda Pro-Crecimiento, a law was passed in November 2002 to create a special tax system (Article 41D Law No. 19840). Under this tax

system, Chile-based companies in which foreign investors have a stake are exempt from tax on the earnings generated by their subsidiaries in third countries. The law also includes rules to ensure transparency. The main provisions of the law can be summarized as follows (Foreign Investment Committee, 2004):

- A company that is set up in Chile exclusively as a platform for investments abroad is exempt from Chilean income tax on the profits that overseas shareholders derive from the company's investments outside Chile.
- Up to 74.99% of the platform company's shareholders can be resident in Chile; non-resident shareholders cannot reside in tax havens.
- Shareholders in the platform company can contribute capital either in the form of shares or equity in other companies, as well as in foreign currency.
- As regards taxes on local shareholders and on investments in Chile, the platform company is treated as a foreign enterprise. As a result, if it invests in Chilean assets, it must pay tax on the profits derived from such investments. Similarly, the earnings of the platform company that correspond to Chilean shareholders are liable for the same tax, and have the same right to tax credits, as an investment abroad that repatriates profits to Chile.
- Platform companies that invest in Chile must distribute earnings in the order in which they were obtained, starting with the oldest. As a result, separate accounting is required for earnings from investments abroad and on assets in Chile.
- There are no restrictions on domestic borrowing by a platform company, but its overseas debt cannot exceed the value of the capital contributed by overseas shareholders. In either case, the company must pay the corresponding taxes (stamp tax in the case of Chilean borrowing or a 4% tax on interest payments in the case of overseas debt).
- The platform company cannot invest in tax havens, which are defined by the Chilean Finance Ministry based on a list prepared by the OECD. This restriction does not apply if, once shares have been purchased or an investment has been made, a country is subsequently classed as a tax haven.
- Platform companies are not entitled to bank secrecy. Any information that is required must be made available through the Chilean Internal Revenue Service, following procedures established in the law and regulations.

4. Business promotion (new business, incubation, entrepreneurship)

a) Basic framework for the business promotion policy

Policies to promote new businesses encompass a wide range of issues including R&D promotion, promotion of new business, development of the high-tech industry, upgrading of existing sectors, formation and expansion of industrial clusters, finance, and so forth. Policy implementation therefore involves a variety of entities such as Ministries and other governmental agencies, business organizations, universities, and NGOs.

In the government sector, one of the missions of the Ministry of Education is human resource development with advanced academic degrees. The National Scientific and Technological Research Commission (CONICYT) is the representative institution in charge of the national R&D policy, and instruments such as Fund for Scientific and Technological Development (FONDEF) and the National Fund for Scientific and Technological Development (FONDECYT).

CORFO is responsible for financial instruments to promote business development. The Technical Cooperation Service (*Servicio de Cooperación Técnica* (SERCOTEC)) is a State institution, whose mission is to support initiatives to improve SME competitiveness and strengthen their management capacities. The other organization that makes an important contribution to technology transfer and human resource development is Fundación Chile, which is an autonomous, non-profit foundation aimed at promoting innovation and technology transfer in areas such as agribusiness, forestry and fishing. An outline of CORFO policy instruments is provided below as an overview of the policy framework for business promotion and industrial development.

CORFO plays an important role in three main fields. The first aims to derive positive externalities that are crucial for promoting technological innovations, investments, clean production, activities for export, and so forth. The second entails facilitating access to crucial markets, including reducing the cost of obtaining information. The third aims to promote complementary coordination compatible with competitive markets, which includes cooperation between similar firms, supplier development, strategic alliances and consortia, and industrial clusters. For these purposes, CORFO coordinates a line of policy instruments (table 20).

One of the characteristics of industrial policy instruments in Chile is that funds for industrial development do not necessarily target specific industries, except in primary products and their derivatives such as agriculture and mining. Some funds are combined in order to accomplish their targets. In case of the IT projects, in the RM CORFO supported 93 firms through FONTEC, 7 firms through FDI, 40 firms through Associative Projects for Development, 30 firms through PDP, four firms through PAG and 204 firms through FAT, in order to promote and facilitate access and use new information technologies, to support the development of e-commerce and process automation by Chilean firms, to foster the development of projects to improve business management through IT use, and to stimulate the implementation of projects making it possible to implement e-commerce in firms.

TABLE 20
MAIN CORFO POLICY INSTRUMENTS

Areas	Funds and Programmes
Quality and Productivity (e.g. ISO-9000, CMM)	Funds for technical assistance (FAT) Programmes to assist management (PAG) Development projects (PROFO) Supplier development projects (PDP) Integrated territorial programmes (PTI)
Investment	Assistance with feasibility studies (PI) Funds for financing advanced studies, SME investments, and export activities (INTERFIN) Support for venture capital funds (KRIESGO) Promotion of investments in the regions (TodoChile) Attraction of high technology investments (Alta Tecnología)
Innovation	National Technological and Productive Development Fund (FONTEC) Economic Development and Innovation Fund (FDI) Other funds for regional development (e.g. Innova BioBio)

Source: Prepared by the author based on *Cuenta pública Abril 2003 - Abril 2004*, CORFO <www.corfo.cl>.

b) Incubation business policy

Current policies for creating new businesses are promoted in cooperation with the government sector, the private sector, and the academic sector. Incubation businesses play key

roles as an interface between these sectors and entrepreneurs. The Government of Chile and other public and private institutions provide incubation and venture businesses with support tools that include access to various funding sources depending on their development stages (table 21).

TABLE 21
TOOLS TO CREATE NEW BUSINESSES

Instruments	Growth stages of new firms			
	Business idea	Start-up	Growing firm	Consolidated firm
Enterprise incubators	x	x	x	
CORFO seed capital	x	x		
Angel investors and private seed capital		x	x	
Venture capital			x	x
FONTEC Line 1 – CORFO		x	x	x
FONTEC Line 2 – CORFO			x	x
FONTEC Line 3 – CORFO		x	x	x
FAT – CORFO		x	x	x
PROFOS – CORFO			x	x
FDI Empresarizable – CORFO			x	x
Fondo de Innovación Tecnológica Bio-Bio			x	x
Programa InterPyME – PROCHILE			x	x
Strategic market orientation – PROCHILE			x	x
Financing of SME investments (Credit line B.11) – CORFO			x	x
Financing of small industry investments, CORFO-Germany (Credit line B.12) – CORFO			x	x
Financing of SME environmental protection investments (Environmental credit B.14) – CORFO			x	x
Financing for foreign buyers of Chilean durable goods and engineering services (Credit line B.21) – CORFO			x	x
Financing of production inputs and marketing abroad (Credit line B.22) – CORFO			x	x
Financing of SME leasing operations (Line A.3) – CORFO			x	x
Coverage of bank loans to exporters (COBEX) – CORFO			x	x
Emerging stock market			x	x

Source: Prepared by the author from information published at <http://www.poralincubacion.cl/>.

Incubation businesses are relatively new to Chile. The Physics and Mathematics Faculty of the University of Chile established EmpresaNet (now known as Access Nova), and the first incubation for high-tech businesses were created in 1996 with financial assistance from CORFO's FDI. Incubations are now established mainly by universities (Universidad del Bío-Bío; Universidad Católica de la Santísima Concepción; Universidad de Concepción; Universidad de Chile; Universidad Técnica Federico Santa María, Pontificia Universidad Católica de Chile; Universidad de Talca; Universidad de la Frontera; Universidad Adolfo Ibáñez), and municipalities (Santiago; Rancagua). CORFO provided these incubations with 632 million pesos in financial assistance (table 22).

As the universities are responsible for more than 40% of total R&D expenditures, with a further 40% contributed by the Government and just 15% by the private sector, new businesses are expected to emerge as a result of technology transfers mainly from the universities.

TABLE 22
ASSISTANCE TO UNIVERSITY INCUBATORS FOR INNOVATION
(1,000 Pesos)

Incubators (universities)	Inaugural year	Support	
		CORFO	Private
U. de Chile, Department of Computer Science (DCC)	2000	165 356	232 566
U. del Bio-Bio + U. de Concepción + U. Católica de Concepción	2000	470 000	940 000
U. de Chile	2001	240 000	367 360
U. de la Frontera	2001	224 072	106 347
U. Adolfo Ibáñez	2002	179 992	305 512
U. Católica	2002	230 000	635 227
U. Santa María	2002	197 698	348 376
U. Católica	2003	232 005	500 454
U. de la Serena + U. Católica del Norte	2003	400 000	265 656

Source: *Cuenta pública Abril 2003 - Abril 2004*, CORFO <www.corfo.cl>

C. Special measures to correct the digital divide between firms

Policy tools for closing digital divide between firms have focused on various issues, including the introduction of computer and other equipment, software, Internet connection, and capacity building. For this reason, in addition to educational institutions such as universities, technical schools, and training centres, private firms and non-profit organizations, a number of Ministries and other government institutions are involved in policy implementation. Individuals are also sometimes included as targets of corrective actions for digital divides between smaller firms, along with their entrepreneurs and employees.

1. Human resources

Although the Ministry of Education is responsible for education policy at the school level and for higher education, the Ministry of Labour and its affiliate institution the National Training and Employment Service (SENCE) are in charge of adult training programmes and lifelong learning. Other government institutions are also working to build capacity among people who are adapted to the emerging knowledge-based economy.

a) Servicio Nacional de Capacitación y Empleo (SENCE)

SENCE runs a tax incentive scheme for company-based training, i.e. for firms that directly provide or contract registered providers to develop training programmes for their workers (World Bank, 2004). The training system has two components. Tax exemption is the main legal instrument for promoting labour training programmes in firms. The system allows companies to deduct the costs incurred in training their workforce from their annual taxable income, up to a maximum of 1% of their total payroll, or more in case of small firms. The National Training Fund (FONCAP) finances actions to train workers, managers, and entrepreneurs in small firms.

The SENCE incentive scheme is widely used by SMEs, which account for more than 70% of the total number of firms using SENCE but less than 25% of the total expenditure on capacity building (Román, 2003).

The training of workers in IT is a strategically important area for SENCE. The Service has been developing e-learning courses since 2003, and also supports implementation of the Digital Literacy campaign.

b) Digital Literacy

In 2003, the Ministry of Education launched the Digital Literacy Campaign. This aims to provide 500,000 people over 15 years of age and not studying in the education system (especially workers, entrepreneurs of micro-enterprises, and housewives) with practical training in IT through the National Infocentre network and other training centres operated by ENLACES (the Chilean school network), BiblioRedes (Library network), SENCE, etc. The curriculum includes basic computer use, word processor, e-mail, and the Internet. According to Agenda Digital 2004-2006, the Ministry of Education intends to train 121,000 people in 2003, 203,700 in 2004, and 175,300 in 2005.

c) Education and training in English

As English is used widely on the Internet and is the lingua franca for international business, the Government of Chile is promoting education and training in English in response to globalization and the knowledge-based economy. The Ministry of Education has established a plan for the reform of education in English that covers not only school education but also job training. According to the Plan, the Ministry will start English courses for entrepreneurs of micro-enterprises and small firms in 2004.

A unique policy tool for FDI promotion is the registry of individuals with English language skills created by CORFO in the framework of the High Technology Programme. Foreign firms that are planning investments in Chile as a business platform can access the database in feasibility study processes and selection of human resources with English certification. In order to develop the registry, CORFO conducted the Test of English for International Communication (TOEIC) in January and February 2004. The 17,430 testees were divided into six groups based on the English language ability, and 15,145 of them with more than 405 points on the TOEIC were registered in the database (El Mercurio, 2005b).

2. Technical aspects

a) Servicio de Cooperación Técnica (SERCOTEC)

The Chilean Technical Cooperation Service (SERCOTEC) is a State institute whose mission is to support and fund initiatives to improve the competitiveness of micro-enterprises and small firms and to strengthen the management capacities of their entrepreneurs. The service works primarily in the development of tourism, small-scale fishing, wood and furniture production, retail trade and crafts. For this purpose, SERCOTEC runs a variety of programmes to increase entrepreneurial association, improve conditions in the business environment, increase their share of sales and take advantage of new business opportunities.

In the IT field, SERCOTEC established infocentre networks for micro-enterprises and small firms nationwide, in alliance with the Solidarity and Social Investment Fund (FOSIS) in order to reduce the digital divide between firms. The Service operates 95 infocentres mainly in the V Region (14 centres), the VIII Region (19) and the RM (17), where workers in small firms are concentrated; and it provides IT training courses in the Digital Literacy Programme (Programa Nacional de Infocentros, 2004). In addition, SERCOTEC is creating a portal entitled “Redsercotec”, through which the centre provides supports for improving the competitiveness of micro-enterprises and small businesses. For example, registered users can consult with professionals from SERCOTEC and other institutions through the portal.

b) Centro Nacional de la Productividad y la Calidad (ChileCalidad)

The National Productivity and Quality Centre ChileCalidad was established in 1994 to provide firms and organizations with technical assistance and training for management innovation. The challenge facing the centre is to enhance SME competitiveness by introducing international standards for management systems. Demand is increasing after the negotiation of FTAs with Europe and the United States.

To this end, in the field of quality management standards, ChileCalidad has been providing technical assistance to SME projects that are partly subsidized by CORFO since 2002, aiming to implement quality management standards. The programme beneficiaries are SMEs working for certification under ISO-9000, ISO-14000, HACCP, GAP and other standards.

3. Financial aspects

Firms in Chile have opportunities to access various financial support mechanisms when they introduce hardware, software and IT services, even if the purpose of such schemes does not necessarily target these activities. Typical examples are CORFO development programmes. SENCE tax exemption can be applied to labour training in relation to IT capacity building. In addition, other government institutions are providing support to promote IT dissemination among SMEs. For example, Banco Estado grants a credit for introducing PCs and Internet. The Under-secretariat for Telecommunications (SUBTEL) subsidizes projects to develop the infocentre network through the Telecommunications Development Fund (FDT).

In contrast to these favourable conditions for IT penetration in SMEs, a recent controversial issue was the high tax rate on software CD, which is considered as a barrier to IT dissemination and a factor encouraging software piracy. Imported software is subject to a 6% import tariff and a 30% additional tax on intellectual products.

4. Infocentres

Universal access to telecommunications services and IT is a major policy issue in developing countries. Although the penetration rate for telecommunication services and IT equipment in Chile is high compared to other Latin American countries, users tend to be concentrated among wealthy people in urban areas and larger firms. One of the most important actions to counter this situation involves building a network of public infocentres, equipped with computer, printer, scanner, photocopy machine, and fax in order to provide services including Internet connection and training in computer use.

The number of infocentres in Chile has grown rapidly over the last few years: in October 2001, there were 160 infocentres; and the number rose from about 190 in July 2002 to over 1,100. As of June 2004, there were 764 infocentres across the country.² These were established by government institutions, NGOs, and others. The main infocentre networks are operated by public institutions such as ENLACES, the Libraries, Archives and Museums Office (DIBAM), National Youth Institute (INJUV), and SERCOTEC.

The Chilean Government has implemented a well-coordinated policy to enable rural and low-income urban residents to access the basic public telephone service by providing subsidies through the Telecommunications Development Fund (FDT I). This fund was established in 1994, with funding from the national budget, and managed by a Council chaired by the Minister for

² Regions I (34), II (33), III (22), IV (33), V (68), VI (55), VII (68), VIII (89), IX (74), X (93), XI (22), XII (24) and RM (149) (Segegob, 2004).

Telecommunications. Before providing subsidies, SUBTEL screened locations for projects that had a positive net social value but were not commercially viable without an initial subsidy. Each project was then awarded to the bidder seeking the lowest subsidy. Up to 2001, FDT I had subsidized the installation of rural telephone services in 6,059 localities.

The Government published a new law for FDT II (Law No. 19,724 of 2001) in order to promote an increase in the coverage of the telecommunications service in low-income areas. The fund subsidizes projects to provide telecommunications services such as public phones, community infocentres, and free television and radio broadcasts. The first bidding process for subsidies was carried out in May 2002. Most of the institutions bidding were NGOs, which were likely to receive subsidies from other sources. Accordingly, infocentre sustainability is considered an outstanding issue. As the number of infocentres increases, more attention will be paid to upgrading the services provided, such as online public services (Wellenius, 2002 and World Bank, 2004).

D. E-government targeting SMEs and trade promotion

The Chilean e-government system, especially SII, is highly regarded internationally. Evidence of this is the United Nations award for “Innovation in Public Service” received by SII in June 2003. The Chilean e-government strategy is based mainly on the national e-government agenda. Efforts to develop some IT systems involve initiatives promoted in public-private partnership, such as Agenda Pro-Crecimiento.

1. Overall strategy/structure of e-government

The Electronic Government Agenda 2002-2005 includes plans, programmes, and activities that are achievable during the current administration led by President Ricardo Lagos. The activities involved in the Agenda are included in the project for Government Reform and Modernization. From this standpoint, the comprehensive incorporation of IT in the government administration system has various objectives, including quality of service; efficiency; transparency; participation; leadership in IT usage; and international competitiveness.

2. E-government applications for corporate service

Chilean Ministries and other governmental institutions have already set up IT systems to provide people and firms with information on this public service, together with the necessary procedures, document formats, and online procedures. According to Agenda Digital 2004-2006, there were 239 portals of ministries and public services in operation, and more than 170 procedures and online services were available. In order to encourage use of these IT-based services and facilitate access to necessary information and services, the Government of Chile established the Trámite Fácil Portal.

The portal has links to online services in 11 areas: civil life; housing; civil security and justice; economy and business; Chileans in foreign countries; job; sports and recreation; infrastructure and transport; health; family; and education and culture. The website also has two links to forms and online procedures. In the business-related area, the Ministry of Economic Affairs designed a single window entitled *SitioEmpresa*, which provides public information and procedures relevant to business activities.

From such online public services, several projects that are used relatively often by firms and individuals, or were launched recently, are mentioned below.

a) E-procurement (ChileCompra)

The public procurement project ChileCompra aims to put all public procurement by public agencies online. Annual business is worth about US\$ 2.5 billion, involving 200,000 central government transactions.

The original ChileCompra portal was designed in 1998 and introduced in 2000. However, it failed to take off successfully because of: (i) lack of leadership and management capable of leading the initiative, (ii) cultural reluctance and ignorance of e-commerce tools, and (iii) weak positioning of the importance of public procurement, and limited political will to support and monitor implementation of the initiative.

The project was redesigned in 2002, backed by the passing of the Electronic Signature Act, and a Government commitment through Agenda Pro-Crecimiento. The Government of Chile, especially the Ministry of Finance, clarified the system's mission and established an institutional framework to ensure implementation of the project.

- Mission:
Develop policies and initiatives to provide transparency and value added to the public procurement market.
- Twin level goals:
 - Primary goals: (i) Strengthen a transparent and widely accessible public procurement system; (ii) Increase public expenditure savings and efficiency.
 - Secondary goals: (i) Favour e-commerce and e-government; (ii) Assure quality in the goods and services procured; (iii) Support competitiveness among domestic firms, promoting innovation projects.
- Numerical targets:
 - 100% of the public procurement reported in December 2003 on a timely basis.
 - US\$ 30 million worth of savings over two years in December 2004.
 - 10,000 suppliers participating in the system.
- Institutional Framework:
A procurement council has been established to monitor implementation of the initiatives.
- Enactment of the new Procurement Act (Law No. 19886):
The new legislation contains articles requiring every public agency to report its procurements on the system.

The results of transactions via ChileCompra are remarkable. In 2003, ChileCompra handled 50% of all tenders for public procurement and investment, worth US\$ 1.3 billion. The number of transactions channelled through the portal rose to 108,000 to account for 54% of the total. The Government achieved a 7% cost saving.

As of March 2004, 64,000 suppliers were registered with the system, most of which are SMEs (micro-enterprises: 73%, small: 19%, medium: 6%, large: 2%). Registered suppliers represent 21% of all firms in Chile: by firm size, 27% of large firms, 20% of medium, and 12% of small firms are listed as suppliers.

ChileCompra is expected to result in explosive spread of e-commerce among SMEs. The Santiago Chamber of Commerce (CCS) estimates that B2B transactions in Chile will grow from US\$ 3.32 billion in 2003 to US\$ 5.757 billion in 2004. ChileCompra will handle 23% of total

B2B, compared to 5% in 2003. As a result, the online sales penetration rate among Chilean firms will rise from 11% to 27%.

b) Integración de Sistemas por Internet, para el Desarrollo de las Operaciones y Regulaciones Aduaneras (ISIDORA)

ISIDORA is the Spanish acronym for Integration of Internet Systems for Development of Customs Operations and Regulations. As mentioned in the section on trade facilitation, ISIDORA is a new customs information system platform making it possible to deal with the following through the Internet: electronic manifests; declaration of departure, entrance, and transit; signature; and payment.

The system development project is implemented in accordance with State Reform and Modernization Project (PRYME), the Office of the Presidency, and the strategic agenda for 2000-2006 defined by the National Customs Service. The latter consists of four lines of action: (i) inspection and sanctions; (ii) computerization of management and automation of processes; (iii) human resource development; and (iv) quality improvement and evaluation of management.

The ISIDORA project is closely related to the second line of action, the objectives of which are: (a) to simplify, automate and incorporate new information technologies into key customs processes; and (b) to generate key information on a timely basis, and to have intelligent processing capacities available to support institutional management. The system also supports the first line of action by providing infrastructure for scientific risk-management techniques.

(i) Single Window for External Trade

The Single Window for External Trade initiative began with the aim of enabling participants in trade value chains to complete all trade-related procedures electronically through the Internet. The single window system allows traders to submit information to just one organization, or with “one click”, through the Internet in order to fulfil all regulatory requirements for exports and imports.

Use of the Internet and digital networks for external trade are considered fundamental to boost the competitiveness of Chilean firms, including SMEs, and the nation as a whole, since it reduces the cost and time spent on trade-related procedures, while also improving the security and transparency of the government operation. As inspections and testing facilities for export/import products are concentrated in Santiago, electronic procedures are expected to dramatically improve the administrative costs and time taken to exchange paper documents.

The specific aims of the project are as follows:

- Elimination and de-concentration of procedures to reduce transaction costs;
- Elimination of unnecessary administrative barriers or restrictions;
- Improvement of service quality;
- Creation of a system that allows Chilean firms to establish simpler and more secure relations with their international customers and suppliers;
- Improvement of the effectiveness of trade control by the Chilean State;
- Coordination of public services pertaining to the trade control network.

The Ministry of Economic Affairs, which is in charge of the single window system for firms, and the National Customs Service promote coordination for development and implementation of the initiative among 18 public institutions with different roles, in a series of actions relating to authorization and control of exports and imports. Among these, the following

eight institutions involved in the initiative reflect private-sector demands for simplification of trade procedures covering 96% of all operations:

- National Customs Service (*Servicio Nacional de Aduanas*)
- Agriculture and Livestock Service (SAG)
- National Fisheries Service (Servicio Nacional de Pesca (SERNAPESCA))
- Institute of Public Health (*Instituto de Salud Pública* (ISP))
- Metropolitan Region Environmental Health Service (*Servicio de Salud del Medio Ambiente* (SESMA))
- Civil Registration and Identification Service (*Servicio de Registro Civil e Identificación de Chile*)
- Under-Secretariat for Transport
- General Treasury of the Republic (*Tesorería General de la República* (TGR)).

Coordination efforts began in 2003; committees were established to coordinate certification and inspection activities and IT system development projects. The other hub should be the customs service portal. At the first stage of system development, such institutions cooperated closely to streamline trade-related procedures. Although coordination is very complicated, efforts are underway backed by the Government commitment expressed in Agenda Pro-Crecimiento and Agenda Digital 2004-2006 (Initiative No. 23).

Some projects to establish interconnection and data interchange between information systems among customs and other public institutions are also underway in 2004, and further progress is expected in 2005.

(ii) *State Payment Portal*

As traders are required to pay not only customs duty but also commissions for the issuance of certificates, the payment system can serve as a hub for interconnection with customs and other institutions dealing with registration, certification and inspection. The State payment portal or single window (<http://www.tesoreria.cl/>), has already enabled agents and importers to make payments electronically for customs procedures.

(iii) *Customs-SERNAPESCA*

In December 2004 these two institutions signed a cooperation agreement to develop electronic transmission systems via Internet and integrated data interchange, in order to speed up procedures relating to health and inspection issues and the loading of fishery products for export (*Oficio Circular* N° 305-23.12.04).

Initially all SERNAPESCA controls will be regularly applied to all exports of fishery products, except that to authorize entry to the primary customs area the National Customs Service will require a Notification of Shipment of Exporting Fishery Products (NEPPEX), authorized through an electronic system linking the two administrations.

To coordinate work with Customs, a one-to-one relation will be established with the Single Exit Document (DUS) and the SERNAPESCA Notification (NEPPEX). An exporter will therefore need NEPPEX for all fishery products included in DUS. At a later stage, electronic processing of the SERNAPESCA authorization will be extended to all fishery products along with information transfer between the two agencies.

These two modifications will be gradually applied across the country, with the first stage (Pilot Plan) being implemented as from January 3, 2005, at the Valparaíso seaport (National Customs Service, released on December 10, 2004).

(iv) *Customs-ISP*

The National Customs Service and Public Health Institute (ISP) launched a project to develop an electronic single window system to facilitate authorization for imports of pharmaceutical products, cosmetics, and sanitary pesticides for domestic use and raw materials for their manufacture in late August 2004. In the first stage of the project, the two institutions will start to interchange electronic information necessary for their trade operations.

The project aims to move from the situation without coordination between the Customs Service and ISP, and IT infrastructure, towards simplified web-based procedures. Prior to the project, there were 27 decentralized regional health services in charge of different procedures. There was no coordination between customs agents, health services, ISP and the National Customs Service. Health services had no centralized database of authorized depositories, pharmaceutical registries, and sanitary control procedures.

The ISP and customs service simplified and developed an electronic form to request importation of the products and incorporate the ISP IT system known as *Sistema de Gestión de Información de Control Nacional* (GICONA) into trade-related procedures. GICONA was created as part of the Chilean Government's "Single Window for Firms" project. The Customs-ISP project for the private sector is expected to achieve total cost savings of at least CH\$750 million annually (Vergara, 2003).

c) **Tax Declaration**

The tax declaration service, which is run by SII, is one of the most widely used e-government services. During the 2004 declaration period (April-May), 1,663,720 income-tax declarations, equivalent to 83% of the total, were submitted via the Internet. The proportion of declarations submitted in this has grown from 5% in 1999, to 55% in 2002 and 70% in 2003. The SII target is to receive 100% of declarations online.

The Internal Revenue Service carried out a nation-wide campaign to promote widespread penetration of the system among the public and SMEs. During the 2004 declaration period the following actions were implemented to assist taxpayers:

- Free Internet Access in nationwide access points: SII formed a partnership with public agencies connected to public Internet access networks, such as infocentres and library networks.
- 67 taxpayer service centres were opened, to provide information for taxpayers in SII, connected to the Internet for self-declaration.
- More than 800 trained monitors assisted declarations in public Internet access locations.
- Stands were set up at shopping malls for online declarations at weekends.
- In order to minimize the time spent on making declarations via the Internet, proposed income-tax declarations were constructed based on data provided by employees, banks, insurance companies, the Pension Funds Regulatory Agency, and others.
- Taxpayers declaring over the Internet receive refunds earlier than those making paper-based declarations.

d) **Electronic invoice**

The Electronic Invoice was trailed during the second half of 2002 by the eight large firms that had already completed the pilot phase. The system enables taxpayers authorized by the SII to

issue electronic invoices, which can be used for credit and debit notes. Users assume obligations, such as having to store purchase and sales ledger information in the electronic format specified by SII.

The e-invoice system is based on advanced technologies that secure and validate the online operation. The technologies involved in the system are: digital certification; electronic signature; two-dimensional (2D) barcode or electronic stamp; and XML. The 2D barcodes, or electronic stamps, are obtained from the authorization code attached to the SII authorization, in order to generate a range of folios for a type of electronic document. The 2D bar code is included in the printed document. The XML is defined by SII to standardize document contents. System users are required to convert their documents into the standardized XML format.

The digitization of invoices is expected to generate major benefits both for SII and for taxpayers. Issuance, storage and printing of paper-based invoices are costly and time-consuming processes for both parties. The system simplifies tax payment procedures and reduces errors. The Santiago Chamber of Commerce has estimated annual cost savings of US\$ 300 million, equivalent to 0.5% of GDP (CCS, 2003a).

The system's beneficiaries would be its large-scale users who issue large numbers of invoices. In contrast, smaller firms do not necessarily have the capability and resources to introduce the system. SMEs that issue fewer invoices have no incentive to introduce the system by themselves. For that reason, fewer than 50 enterprises have been authorized since its full operation in September 2003, all of them large firms (Diario Pyme, 2003). The number of entities authorized in the electronic invoice system was 146 as of 14 September 2004, mostly government organizations and large firms (https://palena.sii.cl/cvc_cgi/dte/ee_empresas?T).

In order to solve these problems, Banderarrollo Servipyme S. A., an affiliate of Banco del Desarrollo, established an application service provider (ASP) service designed for SMEs. This new system is expected to encourage dissemination of the e-invoice system among SMEs.

e) E-finance and e-payment

Leading banks in Chile offer online services for tax payment, together with other online, telephone, and web-based banking services. Users can make online payments for e-commerce, for example using “webpay” developed by Transbank S. A. (<http://www.transbank.cl/>). Although banks are developing IT systems to improve services for customers and explore new businesses with enterprises, SMEs still face difficulties in obtaining bank loans.

In June 2004 the Banks and Financial Institutions Regulatory Agency (*Superintendencia de Bancos e Instituciones Financieras* (SBIF)) and the Chilean Association of Banks and Financial Institutions (*Asociación de Bancos e Instituciones Financieras* (ABIF)) launched an initiative entitled “Ficha Estadística Codificada Uniforme (FECU)” to produce a standardized card for financial information applicable to medium-sized enterprises, with a simplified version for small firms. SBIF and CCS signed an agreement to make these cards available free of charge in Excel format through the CCS website; security will be assured by digital signature. The standardization of financial data is expected to improve information on the financial status of SMEs, along with access to credit and other financial sources.

E. Institutional issues

1. Standardization, such as codes for EDI and cryptograph

Chile has accepted United States and European standards and has not been fully engaged in the standardization process in international institutions. EDIFACT is used for customs-related

systems, and more firms in food-related sectors are required to introduce EAN-UCC standards to establish traceability information systems.

a) EAN-Chile (CNC)

EAN-Chile is a member organization of EAN International, a European body that exists to establish international EDI standards. EAN-Chile is a unique organization in Chile authorized by EAN International to promote use of the EAN system. In the field of food traceability, EAN-Chile has supported industrial associations to develop guidelines for the adoption of EAN standards.

b) National Standardization Institute (INN)

The National Standardization Institute (INN) is responsible for developing and managing technical standardization processes, accrediting certification, and developing the use of metrology. It also guarantees that its certifications comply with ISO-standards and other international guidelines.

2. Public key infrastructures

The Law on Electronic Documents, Digital Signature, and the Electronic Certification Service (Law No. 19,799), enacted in 2002, provides the fundamental framework for the public key infrastructure.

The following three providers of certification and digital signature systems in Chile are accredited by SII and the National Customs Service: E-Certchile; CNC-ONCE, and Acepta.com. The National Electronic Certification Company (E-Certchile) was created by the Santiago Chamber of Commerce (CCS) in conjunction with the Association of Chilean IT Companies (ACTI) and CORFO (<http://www.e-certchile.cl/>). ONCE is the e-certification system of the National Chamber of Commerce. Acepta.com is a private organization established with the support of FONTEC-CORFO. These authorities provide certification of servers, e-mail, and digital signature systems.

In the banking sector, eight large banks in Chile —Banco de Chile, BancoEstado, Security, BBVA, BCI, CorpBanca, Santander Santiago and Scotiabank— formed a strategic alliance with CertiNet in the field of electronic signature. One of the expected benefits from the partnership is that their business sector clients will be able to use the single digital certificate for banking operations with the eight banks integrated into the CertiNet model, based on technology provided by VeriSign —a well-known multinational IT company.

3. Intellectual property rights

The Chilean Constitution protects and guarantees industrial property under provisions contained in Law No. 19.039, published in the Official Gazette of Chile in 1991. The law covers trademarks, patents for invention, utility models, industrial design, and service invention. The Intellectual Property Act (Law No. 17.336) sets forth the basic principles for protecting literary, artistic, and scientific creations including software.

International agreements such as the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and bilateral FTAs, especially with the United States, require Chile to bring its laws on intellectual property rights (IPRs) into line with the highest protection standard. For this purpose, amendments have been made to the country's IPR laws. In 2004, however, the "Special 301" Report published by the United States Trade Representative (USTR) placed Chile on the "watch list" for IPR violations.

In practice, there is room to improve the enforcement of IPR laws. The software piracy rate fell from 97% in 1988 to 68% in 1995, and then dropped to 49% in 2000 where it has since remained. In 2002, the rate was 51%, just below the Latin American average of 55%. It is estimated that 70% of the damage caused by software piracy comes from SMEs and households.

The National Anti-Piracy Commission (CONAPI), along with SII, the National Policy Agency, the National Chamber of Commerce, Services and Tourism (CNC), other governmental authorities and the private sector cooperate in the anti-piracy campaign, enforcing legislation and investigating illegal videos, CDs, software and other products and services.

4. Others: privacy protection

The protection of private data is one of the key issues for encouraging the use of e-commerce. Chile was the first Latin American country to enact a privacy protection law. The Protection of Private Life Act (Law No.19.628) came into force in 1999. It covers the processing and use of personal data in the public and private sectors along with the rights of individuals. The law contains a chapter on the use of financial, commercial and banking data, and specific rules on the use of information by government agencies (Privacy International).

As a private sector initiative, CNC launched CONFIARe to build consumer confidence in the online exchange of private data. The CONFIARe scheme involves self-regulation providing the minimum privacy policy. Websites complying with the norm are allowed to display a CONFIARe trust seal. Although this project is supported by both the private and the public sectors, less than 50 websites are listed as credible and have acquired the seal.

IV. Regional networks

Generally speaking, compared to Asia, Latin America has not established well-organized regional networks and cooperation frameworks. Although existing regional network cooperation is limited, online/offline regional and international frameworks for networking entities are categorized as follows (a) advanced Internet infrastructure; (b) science and technology networks; (c) SME support networks of non-governmental organizations; (d) networks initiated by international organizations; (e) inter-regional and bilateral cooperation; and (f) development of IT tools for international trade and SMEs.

A. Advanced Internet infrastructure

It is essential to establish a reliable international Internet network in order to encourage international cooperation in the IT field. In Chile, the National University Network (REUNA) (<http://www.reuna.cl/>) administers the Chilean high-speed backbone that stretches from Arica to Puerto Montt. REUNA participates in international projects for interconnecting networks.

1. AmericasPATH (AMPATH) network

The AMPATH network is a project of Florida International University (FIU) sponsored in part by the United States National Science Foundation CISE-ANIR division, in collaboration with Global Crossing and other telecommunication product and service providers. Using Global Crossing's terrestrial and submarine optical-fibre networks, AMPATH is interconnecting research and education (R&E) networks in South and Central America, the Caribbean and Mexico with the United States, and non-United States R&E networks via the Internet2 Abilene network and the StarLight International Exchange Point (<http://www.ampath.fiu.edu/>).

2. Cooperación Latino Americana de Redes Avanzadas (CLARA)

Latin American Advanced Network Cooperation (CLARA) is a non-profit association, whose aims are to develop and operate a Latin American research and education network interconnecting the region's National Research and Education Networks (NRENs), and to

promote cooperation in research and education at the regional and global levels via the use of advanced data communications networks. The association was initially formed by the following 13 countries (there are now 19, following the addition of Bolivia, Colombia, Cuba, Dominican Republic, Guatemala, and Nicaragua):

- Argentina: RETINA *Red Teleinformática Académica*
- Brasil: RNP *Rede Nacional de Ensino e Pesquisa*
- Chile: Reuna *Red Universitaria Nacional de Chile*
- Costa Rica: CRNet *Red Nacional de Investigación*
- Ecuador: FUNDACYT *Fundación para la Ciencia y la Tecnología de Ecuador*
- El Salvador: RAICES *Red Avanzada en Ciencia y Tecnología Salvadoreña*
- Honduras: UNITEC *Universidad Tecnológica Centroamericana*
- Mexico: CUDI *Corporación Universitaria para el Desarrollo de Internet*
- Panama: RedCyT *Red Científica y Tecnológica de centros de investigación y universidades*
- Paraguay: CNC *Centro Nacional de Computación, Universidad Nacional de Asunción*
- Peru: RAP *Red Académica Peruana*
- Uruguay: RAU *Red Académica Universitaria*
- Venezuela: REACCIUN *Centro Nacional de Tecnologías de la Información*

CLARA is establishing an inter-regional NREN with the European Union in the framework of the Alliance for the Information Society (@LICE) programme of the European Union, which is a comprehensive cooperation programme in the information society field. An ALICE project entitled “Latin America interconnected with Europe” aims to improve connectivity for research and education institutions within the region by providing a research networking infrastructure within Latin America and its interconnection to the pan-European research network, GEANT (GEANT has already interconnected with networks in the northern hemisphere, or has projects to do so).

According to a press release issued by Delivery of Advanced Network Technology to Europe (DANTE), which coordinates the ALICE project, in May 2004 a new direct connectivity of 155 Mbps in a “ring” topology will be established from 1 August 2004, linking the NRENs of Argentina, Brazil, Chile, Panama and Mexico. This new Latin American ring will be connected at 622 Mbps to the GEANT European research network in Madrid, Spain. In addition, the Venezuelan NREN will be connected to the ring via a 45Mbps circuit between Caracas and São Paulo. Further connections are also planned to link the NRENs of Uruguay and Paraguay to the ring.

B. Science and technology networks

International cooperation between R&D institutions is an important area the IT field, because IT lends itself to collaboration in R&D, the results of which are expected to encourage development of new businesses and industries in the future.

1. Red Hemisférica Interuniversitaria de Información Científica y Tecnológica (RedHUCyT), Organization of American States (OAS)

The Hemisphere-Wide Inter-University Scientific and Technological Information Network (RedHUCyT) project was approved by the General Assembly of the OAS in 1992. Its main objective is to connect the institutions of member countries to the Internet, integrating an electronic network for the exchange of scientific and technological information among professors, researchers, and specialists from different universities in the OAS member States. For this purpose, the project provides high-tech equipment, technical support and specialized training; and it sponsors technical workshops and seminars in the region to prepare technical projects, improve skills, share technical knowledge and train network managers (<http://www.redhucyt.oas.org/>).

2. Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo (CYTED)

The Ibero-American Programme of Science and Technology for Development (CYTED) was created in 1984 under an interagency agreement signed by 19 Latin American countries, together with Spain and Portugal. CYTED is an international programme for multilateral scientific and technological cooperation, which includes the field of IT as a sub-programme. Organizations from the following countries are currently participating in the programme, along with international organizations as observers (<http://www.cytel.org/>):

Countries: Argentina, Bolivia, Brazil, Chile (CONICYT), Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Portugal, Spain, Uruguay, Venezuela.

International Organizations: Convenio Andrés Bello (CAB), ECLAC, Inter-American Development Bank (IDB), Organization of American States (OAS), Organization of Ibero-American States for Education, Science and Culture (OEI), UNESCO.

3. Scientific Electronic Library Online (SciELO)

The SciELO is an electronic library covering a selected collection of scientific journals. The project is an initiative developed by the State of São Paulo Research Foundation (FAPESP) and the Latin American and Caribbean Centre on Health Sciences Information (BIREME). Four countries (Brazil, Chile, Cuba and Spain) are participating in the activity.

The Project aims to develop a common methodology for the preparation, storage, dissemination and evaluation of scientific literature in electronic format. SciELO collections can be accessed through its web portal (<http://www.scielo.org/>).

C. SME support networks of non-governmental organizations

International non-governmental organizations (NGOs) are located in Latin America to complement efforts by local governments and international organizations to support capacity building and financing by SMEs and to develop export-oriented SMEs. The followings NGOs are examples of such entities.

1. Fundación para el Desarrollo (FUNDES)

FUNDES (<http://home2.fundes.org/>) is a business solutions network that works to improve SME competitiveness and business environment. It was created in 1994 in Panama and has a presence in 11 Latin American countries (Argentina, Bolivia, Colombia, Costa Rica, Chile, El Salvador, Guatemala, Mexico, Panama, Peru, and Venezuela). The institution offers integrated services to SMEs including business development, business training, consulting, eco-efficiency, financial services, and e-business and new technologies.

MIPYME (www.mipyme.com) is a portal that integrates the services of FUNDES, which includes, in the case of its Chilean site: (a) online consultation with experts, (b) online quotation, (c) access to financial resources and funds offered by the institutions allied with FUNDES (such as online credit from Banco Santander, and the Small Enterprise Assistance Fund (SEAF) capital fund; (d) marketing (the Government procurement system ChileCompras, enterprise linkage salon), and (e) SME Toolkit developed by the International Finance Corporation (IFC) of the World Bank Group.

FUNDES also offers an enterprise linkage programme that organizes business roundtable events to develop face-to-face relationships and generate business between large firms and SMEs.

2. Endeavour

Endeavour is a non-profit organization, established in 1997 when the sharp decline of Thai baht devastated the region's economies and put the global economy under threat. Its aim is to spur economic growth in emerging markets and bridge the gap between micro-credit organizations and large-scale public-works projects.

Endeavour started operations in Chile in 1997 and Argentina in 1998 with a rigorous five-step approach: (a) Identify high-growth, innovative entrepreneurs lacking systematic support; (b) Support selected Endeavour Entrepreneurs by supplying mentoring, training, networks and access to capital; (c) Unite investors, mentors and entrepreneurs in a network bound by shared values and goals; (d) Disseminate best practices in entrepreneurship through conferences, media, case studies and online tools; (e) Promote local entrepreneurial role models to encourage the belief that individuals living anywhere, from any background, can turn ideas into world-class ventures.

Expanding its network to Brazil, Uruguay (in 2000) and Mexico (2001), it has established a strong reputation. In 2002, the Schwab Foundation and World Economic Forum endorsed Endeavour as one of 40 leading examples of social entrepreneurship from around the world and as a pioneer in the "Global Digital Divide Initiative." In 2003, the International Finance Corporation (IFC) (the private-sector arm of the World Bank) funded Endeavour scoping missions for the launch of Endeavour Africa in 2004 (<http://www.endeavor.org/>).

D. Networks initiated by international organizations

International organizations such as the United Nations have implemented programmes to establish online networks of SMEs in order to promote international trade. SMEs in Latin America have participated mainly in that kind of framework rather than projects created from regional perspectives.

1. World Trade Point Federation (WTPF)

The World Trade Point Federation (WTPF) (<http://www.wtpfed.org/>) is an international non-profit association established under Swiss law in 2000. It grew out of the UNCTAD Trade Point Programme launched in 1992. It has established a network of more than 120 trade information and facilitation centres, known as Trade Points, through which it assists SMEs in over 90 countries worldwide. It has also created regional Trade Points Forums in Africa, Asia-Pacific, Arab, Europe, and the Americas (Inter-American Trade Point Forum, IATPF)

The main strategic objectives of WTPF are to: (a) increase the participation of SMEs in international trade; (b) help SMEs trade more efficiently; (c) help Trade Points to become “one-stop-shops” where SMEs can obtain a full set of services with regard to trade information, facilitation and transaction, as well as electronic commerce.

In order to accomplish its mission, the Federation:

- (i) Helps SMEs find reliable business partners in more than 90 countries worldwide and acts as a local representative.
- (ii) Provides access to international market and investment information worldwide through its website.
- (iii) Provides a unique Electronic Trading Opportunities (ETO) system, which allows SMEs to post and receive business opportunities daily and free-of-charge. Currently, around 14,000 ETOs are posted per month.
- (iv) Offers SMEs a non-stop presence on the web. The Federation maintains a global client database, which currently features 43,000 companies from 61 countries. Companies in countries without operational Trade Points can register free-of-charge at a central registration facility on its website.
- (v) Assists SMEs in becoming more active in e-commerce by providing them with the Electronic Trading Opportunities service, as well as, through local Trade Point offices, services for the development of electronic catalogues, access to e-mail and the Internet, online transaction services, etc.

2. International Trade Centre (ITC)

ITC (UNCTAD/WTO) launched E@ITC website (<http://www.intracen.org/e-trade/>). The website provides a single access window to ITC “e-facilitated” trade development activities, aiming to support SMEs in developing countries and economies in transition to access new opportunities offered by IT and compete in the new economy. The website contains information on ITC e-related programmes, publications and tools for creating the e-trade environment and adjusting traditional business to new methods. The site also provides a discussion forum allowing for interactive dialogue on e-related issues.

3. Development Network (Devnet)

The Devnet Association is an international network providing business information and management assistance services to enhance the competitiveness of micro, small and medium-sized enterprises worldwide.

Within Devnet, there are two main international programmes: TIPS (Trade and Technology Information Promotion System) and WINNER (Women into the New Network for Entrepreneurial Reinforcement), as well as a regional programme in Latin America known as ALPYMES.

a) Trade and Technological Information Promotion System (TIPS):

TIPS (<http://www.tips.org/>) prepares and disseminates, offers and demands collected directly from the firms participating in the network. The information, regularly checked and updated by Devnet bureaux, covers the following production and service sectors: agro-industry, food, construction, chemistry, pharmaceuticals, fishery, biotechnology, machinery, packaging, tourism, leather, energy, electronics, transportation, textiles and environment. TIPS portals on the Internet also publish policy papers and analyses on regional integration, information for environmental management, systems for production activities, technical standards and quality regulations, calendar of fairs and congresses, international co-operation, financing and projects.

b) Women into the New Network for Entrepreneurial Reinforcement (WINNER):

WINNER (<http://www.winner-tips.org>) is a global project to strengthen the practical and technical skills of women entrepreneurs through basic training on information and communication technologies. Beneficiaries receive training on e-commerce, international trade, fair trade, business management and gender issues, with a view towards promoting access to local, regional and international markets.

c) Pequeñas y Medianas Empresas de América Latina (ALPYMES):

Sponsored by the European Commission and UNDP, ALPYMES (www.alpymes.net) is a programme executed by Devnet providing Latin American small and medium-sized enterprises with the tools and instruments (training, website, e-commerce) needed to facilitate their own direct participation in regional and international trading.

Devnet is a non-profit international NGO, with category 1 consultative status granted by the United Nations Economic and Social Council (ECOSOC). Its activities date back to 1986 when the United Nations Development Programme (UNDP) and the United Nations Science and Technology Fund (UNFSTD) entrusted the execution of TIPS to Devnet, by channelling a large contribution made by the Italian Government. In the ensuing years, the European Commission provided substantial funding for the development of the TIPS network in Asia and Latin America through its AL-Invest and Asia Invest programmes.

Devnet's national bureaux gather information directly from firms. They assist in establishing business-to-business contacts, and connect buyers and sellers of technology, services and products through the Internet. Available in English, Chinese, Portuguese and Spanish, over 40 Devnet information services cover areas of interest such as technology, products, services, finance, economics, trade and technology policies and regulations, quality and clean production technologies and processes, and environmental management systems, focusing specifically on conservation and protection.

There are 500,000 SMEs linked directly to the network as of 2001, and more than two million networked with over 300 chambers of commerce and industry, and business organizations that signed cooperation agreements with Devnet. Devnet organizes training courses and designs technology-based products and services that are tailored to the needs of its users.

E. Inter-regional and bilateral cooperation

Inter-regional cooperation facilitates the sharing of experiences on a counterpart basis, and the establishment of common bases for strengthening economic relations. Latin America has close

relations with the European Union and the United States. Chile, Peru, and Mexico are establishing closer relations with the Asia-Pacific region through the Asia Pacific Economic Cooperation (APEC).

1. Alliance for the Information Society (@LIS) (European Union-Latin America)

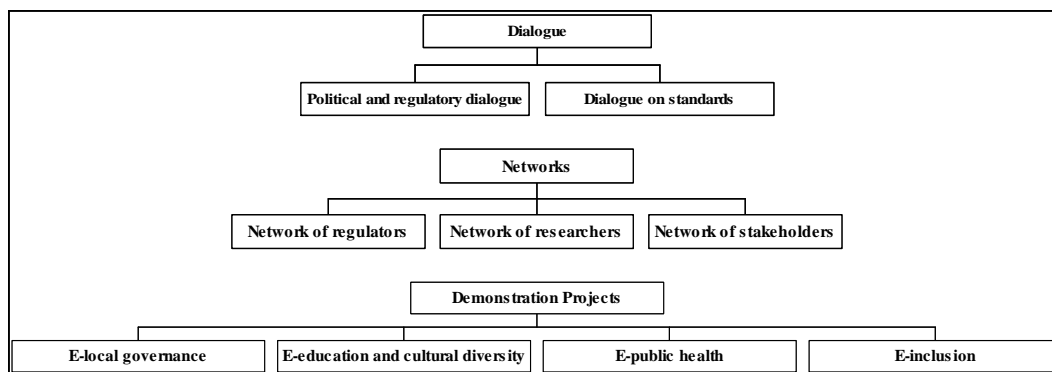
The Alliance for the Information Society cooperation programme (@lis) (http://europa.eu.int/comm/europeaid/projects/alis/index_en.htm) is the result of the first Summit of the Heads of State of the European Union, Latin America and the Caribbean, held in Rio de Janeiro in June 1999.

The participants are 15 European Union countries and 18 from Latin America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela).

Adopted by decision of the European Commission on 6 December 2001, the @lis programme has a budget of € 85 million, of which € 63.5 million (75%) will be financed by the European Commission, with the rest coming from contributions made by Latin American and European Union partners participating in the programme.

The programme aims to reinforce the partnership between the European Union and Latin America in the Information Society domain. Its objectives are to establish dialogue and cooperation on policy and regulatory frameworks in key areas and to boost interconnection between research networks and communities in the two regions. Activities for 2002-2005 fall within the scope of three intervention fields: (a) dialogues (on policy and regulation, and on standardization issues); (b) networks (of stakeholders, and interconnection of research networks), and (c) demonstration projects. As mentioned above, installation of a direct bandwidth connection is one of the @LIS actions.

FIGURE 11
FRAMEWORK OF THE @LIS PROGRAMME



Source: European Union <<http://www.eurunion.org/>>

As a result of the technical evaluation performed in January 2003, 19 proposals were selected as @LIS Demonstration Projects. Chilean institutions will participate in the subsequent projects; some of the for e-inclusion projects, which consist of “ADITAL” and “Link all,” make use of IT by SMEs or facilitate linkages between SMEs in the targeted sectors.

a) Alliance for the Development of Information Technologies in the Rural Areas (ADITAL) (América Latina y Europa):

The ADITAL project will transfer rural development models and best practices in the use of IT systems in the rural sector, from three advanced European regions to five regions in Argentina, Chile, Peru and Bolivia. It will establish a portal to exchange experiences and knowledge of rural development, agricultural production techniques and IT systems, between experts and farmers in both regions. The portal will integrate community services and an e-learning system to effectively transfer knowledge. The project will also perform effective actions on each target site, in order to transform the agricultural sector by implementing customized IT systems to support integrated production management and market information systems (http://europa.eu.int/comm/europeaid/projects/alis/adital_en.htm).

b) Local-communities Insertion Network para América Latina (Link-all):

The Link-all project aims to assist the uptake of innovative IT practices, support collaboration, promote exchange of experiences, transfer know-how and improve related skills in three targeted sectors-crafts, eco-agro-tourism and culture. The Link-all platform to be created will include IT tools providing a range of key facilities to strengthen the integration of local development activities. Five networked demonstrators will be deployed in selected areas (Brazil, Uruguay, Argentine-Chile, Colombia, and Costa-Rica). Communication facilities including satellite coverage and wireless applications will be provided. Training activities will be implemented and a coherent business framework will be developed (<http://www.link-all.org/>).

TABLE 23
@LIS DEMONSTRATION PROJECTS IN WHICH CHILEAN INSTITUTIONS ARE PARTICIPATING

Field	Title	Applicant	Chilean partner
E-education	European-Latin American new education	Universidad Carlos III de Madrid (ES)	Universidad de Chile
	Advanced technology demonstration network for education and cultural applications in Europe and L.A.	Universidad Politécnica de Catalunya (ES)	Universidad Tecnológica Metropolitana (UTEM)
	Cibernarium, <i>Entornos pedagógicos para la divulgación y capacitación digital</i>	Ayuntamiento de Barcelona-Barcelona activa (ES)	Corporación Local Maule Activa
	Integrating new technologies in school: developing and promoting core competencies in Argentina, Chile and Uruguay	Istituto Superiore Mario Boella sulle tecnologie dell'informazione e delle telecomunicazioni (IT)	Universidad Católica de Valparaíso, Secretaría Regional Ministerial de Educación de la V Región, Ministerio de Educación
E-inclusion	Adital-Alliance for the development of information technologies in rural areas	Exma. Diputación Provincial de Huelva (ES)	Municipality of Rancagua
	Link all – Local-Communities Insertion Network for L.A.	EEF (GR)	GEDES
E-governance	Met@logo(c)	GTZ (DE)	MICH
E-health	Health for all in L.A.	Fondazione angelo celli per una cultura della salute (IT)	Pontificia Universidad Católica de Chile

Source: European Union <<http://www.eurunion.org/>>

2. Asia Pacific Economic Cooperation (APEC)

The APEC is an intergovernmental grouping made up of 21 member economies, including Chile, Mexico and Peru. It is designed to promote cooperation and growth as well as the liberalization and facilitation of trade and investment within the Asia-Pacific region. In fact APEC committees and groups address a wide range of themes that include fields closely related to IT for international trade and SMEs such as customs procedures and e-commerce.

TABLE 24
APEC COMMITTEES AND GROUPS

Committee on Trade & Investment	SOM Special Task Group	Working Groups	Other APEC Groups and Initiatives
<ul style="list-style-type: none"> • Competition Policy and Deregulation Group • Dispute Mediation • Early Voluntary Sectoral Liberalization • Government Procurement Experts' Group • Group on Services • Informal Experts' Group on Business Mobility • Intellectual Property Rights Experts' Group • Investment Experts' Group • Market Access Group • Rules of Origin • Sub-Committee on Customs Procedures • Sub-Committee on Standards and Conformance • Strengthening Economic Legal Infrastructure 	<ul style="list-style-type: none"> • Counter Terrorism Task Force • Secure Trade in the APEC Region (STAR) • Counter Terrorism Action Plans • Electronic Commerce Steering Group • Gender Focal Point Network • Health Task Force • APEC Social Safety Net Capacity Building Network • Emergency Preparedness Virtual Task Force 	<ul style="list-style-type: none"> • Agricultural Technical Cooperation Working Group • Energy Working Group • Fisheries Working Group • Human Resources Development Working Group • Industrial Science and Technology Working Group • Marine Resource Conservation Working Group • Small and Medium Enterprises Working Group • Telecommunications and Information Working Group • Tourism Working Group • Working Group on Trade Promotion • Transportation Working Group 	<ul style="list-style-type: none"> • APEC Food System • APEC Study Centres Consortium • Agricultural Biotechnology • Finance Ministers' Process • Free Trade Agreements and Regional Trade Agreements • Human Capacity Building (Beijing Initiative) • Life Sciences Innovation Forum • New Economy - e-APEC Strategy • Sustainable Development

Source: APEC <www.apec.org>

Note: The table excludes the Budget & Management Committee, Senior Officials Meeting (SOM) Committee on Economic and Technical Cooperation, Economic Committee.

a) The e-APEC Strategy

APEC started full cooperation and partnership for obtaining the economic and social benefits of the “new economy” at the Brunei Summit in November 2000 which launched an Action Agenda for the New Economy.

The e-APEC Strategy was endorsed at the thirteenth APEC Economic Leaders' Meeting in Shanghai in 2001. The Strategy identifies the necessary policy environment and specifies appropriate goals and actions, drawing on existing APEC efforts. It develops a forward-looking, long-term and action-oriented plan in three main areas:

- Creating an environment to strengthen market structures and institutions, i.e. open markets and strong institutions.
- Facilitating an environment for infrastructure investment and technology development i.e. a favourable investment and innovation climate.
- Enhancing human capacity building and promoting entrepreneurship i.e. emphasis on education and SMEs.

The third item stressed SME participation in the new economy. The Strategy set a goal of creating: (i) a competitive environment for SMEs in terms of market entry, cross-border trade and financial/tariff policies with more opportunities to promote their business, and (ii) a pro-SME environment for using external resources at lower cost. In order to achieve this goal, the Strategy identified necessary actions, as follows:

- Take steps to set up an APEC-wide mechanism for sharing information on startup enterprises, venture capital and capital markets;
- Make financial and capital markets more accessible to SMEs;
- Increase transparency in rules and regulations, and provide information and business contacts to SMEs, including through e-government initiatives;
- Provide avenues for SMEs to improve their knowledge and skills through participation in APEC human capacity building programmes;
- Promote strategic alliances between large firms and SMEs, on the one hand, and strategic alliances among SMEs such as through industrial clusters, on the other, for supply chain management;
- Increase SME involvement in relevant projects across APEC forums;
- Provide SMEs with capacity to remain productive in the face of rapid economic and technological change;
- Consider the establishment of an APEC SME portal linked to the APEC website.

b) Websites for SMEs

APEC has websites and portal sites already established for SMEs and international trade.

(i) *APEC-Pacific Economic Cooperation Council (APE-PECC) SME Small Business Information Hub*

This website (<http://www.smallbizapecc.org/page.php>) is designed to help micro, small and medium-sized business find relevant reliable information about doing business in the APEC region. It provides direct links to useful official government sites; chambers of commerce and industry sites; and non-government commercial sites.

(ii) *APEC Centre for Technology Exchange and Training for Small and Medium-sized Enterprise (ACTETSME)*

This site (<http://www.actetsme.org/>) provides a variety of information on SMEs such as links to international SME associations and institutions, links to business directories, and the online business database entitled "Let's Do Business."

(iii) *Let's Do Business*

This page on the ACTETSME website contains a searchable online business database with free advertisement posting to facilitate trade and business matching. The information posted by SMEs is mainly in the following categories:

- Buying: Requests for products and services.
- Selling: Offers of products and services.
- Joint Venture: Seeking business partners.
- Subcontracting: Subcontracting opportunities.
- Others: Miscellaneous advertisements.

(iv) *APEC Tariff Database (<http://www.apectariff.org/>)***(v) *APEC Intellectual Property Rights Experts Group (IPEG) Website***

This site (<http://www.apecipeg.org/>) has been developed to provide information on the intellectual property systems existing in each member economy of the APEC community. It also provides a wide range of IP links and contact points, along with details of future IT events in the APEC region.

c) *Electronic Commerce Steering Group (ECSG)*

E-commerce is identified as one of the important ways of facilitating trade transactions between economies. The Electronic Commerce Steering Group (ECSG) (<http://www.export.gov/apeccommerce/>) was created to provide a coordinating role for APEC e-commerce activities, based on the principles set out in the 1998 APEC Blueprint for Action on Electronic Commerce. The ECSG works to create legal, regulatory and policy environments, and to promote mechanisms to increase trust and confidence among participants in electronic commerce in order to encourage greater use of the Internet to perform transactions. The main themes being addressed by the committee are: data privacy; paperless trade; consumer protection; cyber security.

d) *Trade facilitation and paperless trade*

Trade facilitation is one of the few initiatives that are progressing in accordance with a schedule and a numerical target. One of the guiding principles is the Trade Facilitation Action Plan (TFAP) adopted by the APEC Leaders and Ministers in 2002. The plan aims to reduce business transaction costs by 5% by 2006.

According to “APEC Strategies and Actions toward a Cross-Border Paperless Trading Environment” drafted by ECSG in May 2004, the latter is planning to take action for trade facilitation in cooperation with the private sector, based on the timeline set out below. ECSG is also planning pilot programmes and capacity-building activities.

- 2006** As part of the APEC Trade Facilitation Action Plan, interested member economies implement the Electronic Certificate of Origin (ECO) and Electronic Sanitary and Phyto-sanitary Certificates (e-SPS) Pathfinders for the cross-border transmission of electronic certificates of origin and electronic sanitary and phyto-sanitary certificates.
- 2010** Most member economies establish a domestic paperless trading environment and implement pilot schemes for electronic cross-border transmission of customs clearance data.
- 2020** APEC establishes a comprehensive paperless trading environment that allows for electronic transmission of trade-related information across the region.

e) The Secure Trade in the APEC Region (STAR) initiative

Counter-terrorism is an increasing concern in the trade and transport domain. The APEC leaders issued a statement on Fighting Terrorism and Promoting Growth in Mexico in October 2002, which contained a commitment to adopt specific additional measures against terrorism.

Key counter terrorism priorities include the Secure Trade in the APEC Region (STAR) initiative, which aims to secure and enhance the flow of goods and people through measures to protect cargo, ships, international aviation and people in transit; halting the financing of terrorism; promoting cyber security and so forth.

More economies are introducing information technologies as key tools to achieve these goals, while simultaneously strengthening requirements for capacity building, technical assistance and public-private collaboration for secure trade.

F. Development of IT tools for international trade and SMEs

There are a number of initiatives to develop IT tools for business management, which are available to SMEs at discounted prices or free of charge. Although these are not efforts directly related to network building among SMEs, they will enable SMEs to improve their productivity and facilitate participation in the cyber or foreign market.

1. United Nations Conference on Trade and Development (UNCTAD)

UNCTAD has developed the following computerized systems to respond to increasing demands for electronic customs or for transparency and efficiency in the transport sector:

- Automated System for Customs Data (ASYCUDA)
- Advance Cargo Information System (ACIS)

ASYCUDA has already been installed by over 70 countries, while Chile is developing its own system.

2. SME Department of the World Bank Group

The SME Department of the World Bank Group (www.ifc.org/sme) has developed the SME Toolkit (<http://www.smetoolkit.org/>). Through its website, SMEs can gain online access to business forms, tools and training and other information and resources related to accounting and finance, business planning, human resources, legal and insurance, marketing and sales, operations and technology. In case of e-commerce, for example, users can download ShopFactory e-Flash V5.5 to create their own websites.

V. Conclusion and recommendation

A. Lessons from the Chilean experience

1. Current status of exports by Chilean SMEs

- (a) Few SMEs have succeeded in participating directly in the foreign market, but seem to contribute indirectly to Chilean exports by participating as suppliers of inputs and services in supply chains organized by large firms.
- (b) The main articles exported by SMEs are primary products and their processed goods. Consumers in export markets demand high-quality products and require producers to maintain safety information.
- (c) The main export markets for Chilean SMEs are in Latin America. This is true not only of manufactured products but also software and IT services. Chilean SMEs have not cultivated the growing Asian market, although Asia is the most important market for large firms.

2. Problems faced by SMEs

a) Barriers to participation in the foreign market

- The main weaknesses of SMEs include quality management, information management, and marketing and sales. Scant use of IT makes it harder for SMEs to implement well-coordinated management systems for customer-oriented service, planning and inventory control, and financial management.
- Fewer Chilean firms obtain international certifications than those from developing countries in Asia. The Chilean enterprises that have obtained international certification are mainly large firms.
- Such weaknesses originate from a lack of human and financial resources.
- Higher shipping and other transaction costs prevent SMEs from exporting their products, or do not allow them to export to distant markets.

b) Barriers to the promotion of e-commerce

The barriers facing SMEs in participating in online transactions mainly consist of difficulties in accessing the Internet and problems applying it to their businesses.

- For smaller firms budget constraints pose a major barrier to introducing the Internet, although PC prices and Internet access charges are both falling.
- Important factors that cannot be overlooked include a lack of Internet knowledge, capability, confidence and interest. Lack of understanding can cause disinterest in the Internet and its applications.
- Lack of need is the main reason why SMEs do not make use of the Internet for procuring inputs and for selling their products and services. There is also the possibility that low penetration of e-commerce among their suppliers and customers produces a vicious cycle of perceived demand for e-commerce.

3. Lessons learned from Chilean methods of export promotion

The Government of Chile is vigorously implementing its export promotion policy, which includes policy instruments frequently introduced in developing countries such as tax incentives for FDI and promoting new businesses, and subsidies for SME capacity building. The export promotion agency and other agencies for SME development provide SMEs with information for marketing, trade and other business management, consultation services, financial support for capacity building, and so on.

As policies for using the Internet to promote international trade, it is necessary to enhance credibility among the buyers and sellers who participate in online networks, the products offered on websites, IT literacy and capacity for e-commerce among SMEs, and to establish e-business platforms.

Policy issues can be classified in three groups, which are closely related to each other, and are dealt under the public-private partnership (PPP) system.

a) Measures against barriers to foreign market participation

(i) Management and quality control in accordance with international standards

Clients feel safer doing business with SMEs that can provide products and services, or manage processes under international standards such as ISO-9000, 14000 and CMM. Standardized management also make it easier to introduce IT in a firm and to share information between firms by using IT.

Nonetheless, it is hard for SMEs to gain international standard certification, given the high costs of obtaining and maintaining certifications and lack of human resources. The policy instruments implemented by the Chilean Government and business associations relate to the following.

- Creation of country standards or guidelines compatible with international ones, together with the corresponding installation manuals.
- Capacity building and financial support for obtaining international certifications.

(ii) Branding strategy at the state, regional and firm levels; protection of Intellectual Property Rights (IPR) and trademarks

It is important for SMEs to make their products and services more visible, in order to cultivate markets in foreign countries and in cyberspace. One of the strategies for SMEs to

achieve this is to raise brand awareness and to sustain the credibility of their labels. The protection of trademarks and other intellectual property rights is therefore an important policy for developing countries.

A typical case is the wine sector, which has not previously been mentioned in this paper. Individual wineries introduce wines that have won prizes on their websites. They often organize a winery tour for which tourists can apply for participation through their websites. The origin of wines, printed on the labels, is registered by valley. In some valleys, groups of wineries have organized winery tours in cooperation with the tourism sector, thereby contributing not only to development of the wine sector in the region in question but also to regional development.

(iii) Grouping and clustering (sector and regional levels)

The grouping of firms and development of an industrial cluster create positive effects that encourage the development of industries and regions by, for example:

- Making it possible to exceed a critical mass for introducing IT-related infrastructure, utilities and facilities.
- Facilitating information exchange and technical and knowledge transfer through face-to-face and Internet communications among firms in a given sector.
- Facilitating information exchange and technical and knowledge transfers from universities and research institutions to industrial sectors, and between different industrial sectors. Parts of the latter stem from the effects of clustering in a specific sector.

(iv) Cooperation with importing countries

Free trade agreements and dialogues with importing countries give Chile additional opportunities to gain information on regulatory requirements and market demands in those countries and to cooperate with them in order to respond to them without difficulty.

b) Trade facilitation measures

Even if firms have the products, services, and administration capabilities to participate in foreign markets or they have already succeeded in making contact with promising customers, some of them will face difficulties in starting and maintaining transactions, arising from costly international trade procedures. In order to increase business opportunities, the Chilean Government, NGOs and other institutions can take the following measures for SMEs.

(i) Provision of market information through websites/establishment of a marketplace for making bids

Information exchange is the simplest and most common use of the Internet to promote international trade. SMEs can access websites established by the Chilean Government, NGOs and international organizations in order to obtain necessary information. They can also submit bids to start businesses and publish advertisement at zero or low cost.

(ii) Provision of online and offline consultation services/arrangement of business meetings

Consultancy and other online and offline services will complement information provision via websites. These can be offered by government agencies, NGOs, business organizations and private firms.

(iii) Trade facilitation

Although studies implemented earlier have identified the high costs of trade procedures, transport costs also weigh heavily on SMEs. Heightened security concerns add to the

complexities of managing trade chains. Efficient trade chains are a key factor for SMEs facing high transportation costs with fewer capabilities for managing trade procedures.

Key factors for establishing efficient systems for controlling international trade are: (a) public-private partnerships; (b) dialogues and agreements with trade partners that include FTAs, international organizations and intergovernmental forums such as APEC; and (c) full use of IT.

Simplification and harmonization of trade procedures and working rules for information systems within a government and between trade partners can ease the burdens involved in international trade and help develop information systems. International cooperation is necessary for this.

As the trade facilitation concept expands its scope of activity from trade-related procedures within governmental institutions to entire trade chains that include the transport sector, it is becoming impossible to achieve trade facilitation policy goals in the absence of well-organized public-private partnership.

c) IT policy and measures for promoting e-commerce and other IT applications

(i) Capacity building

Information, IT services and software are supplied by private firms and public and international entities. Even though SMEs with Internet connection can gain access free of charge or at low prices, they do not necessarily have the capabilities needed to make full use of them.

(ii) Confidence-building among suppliers and purchasers

Businesses should be started after confidence has been established in trading partners and their products and services. For this reason, firms are required to undertake careful research before entering into business relationships with trading partners. They need to gather a huge variety and large quantities of information such as macroeconomic statistics, company profile, credit information, regulations and so forth. Parts of such information can be shared at low cost by using the Internet and a platform accessible by registered users.

(iii) Confidence-building for secure online transactions

This is a key issue in e-commerce; at minimum it is necessary to establish ground rules for managing online transactions, relevant laws and regulations, and technical standards such as electronic signature and encryption.

(iv) Building affordable IT platforms for SMEs

The establishment of infocentres is a common policy for overcoming difficulties in access to the Internet. Nonetheless, problems remain for SMEs to use IT applications for business management on shared computers.

The Chilean Government, NGOs and business associations are working together to establish IT platforms for databases of trade-related information, traceability and other information management systems, to which SMEs can gain access through the Internet even from public spaces at affordable cost.

(v) E-government

E-government becomes not only a tool to improve the efficiency and transparency of the public sector but also a demonstration facility enabling users to experience online transactions and realize their immense value.

The public sector can create an e-procurement system, which SMEs can access at low cost through the Internet. As the public sector is the most credible trading partner, SMEs can offer their products and participate in bidding with a sense of security.

The Chilean experience of the tax system suggested that economic incentives, simplified procedures and instruction support could encourage greater use of e-government.

By opening up the standards and data formats introduced by an e-government system, the private sector will be able to create information systems that enhance linkages and cooperation between the e-government system and internal systems owned by private firms.

(vi) *Trade facilitation*

IT is a key tool for achieving efficient trade facilitation systems. Chile has established information systems for e-customs, a database of the tariff schedule applicable to individual trade agreements, applying for certificates of origin and obtaining port information, parts of which were developed under cooperation between the Government and business associations. In case of the e-customs system, users can obtain software, together with information in XML format that helps firms exchange data between the customs system and their own internal management systems.

Nonetheless, the country has not established a single window system, through which trade entities can complete all trade procedures with one click of the mouse. Data interchange between trade partners also remains a major policy issue.

B. Prospective intergovernmental cooperation in the field of IT and trade promotion

There are initiatives for using IT as a tool to promote international trade by SMEs. Each country implements its IT policy, creates websites, and collaborates with the private sector, NGOs, international organizations, and aid agencies from foreign countries.

International organizations establish frameworks for facilitating international trade, which include technical standards, working rules and relevant laws for EDI and e-commerce, health guidelines, together with other regulations and conformity assessment systems.

Intergovernmental cooperation can complement efforts made by individual countries and international society. Latin America has entered not only intra-regional partnerships but also cooperative relations with other regions, especially Asia.

When the decision is made to launch a new framework for intergovernmental cooperation in Latin America, it will be possible to take various approaches to different policy issues and to exploit achievements by existing initiatives in which a number of Latin American countries are involved. The following are possible approaches and fields that Latin American countries can address within the intergovernmental cooperation framework, particularly between Asia and Latin America.

1. Establishment of a framework for dialogue on trade-related issues

Dialogue for the purpose of establishing common interpretations of rules and their application, and issues related to international trade and IT standards among trade partners are prerequisites for setting up and improving IT applications for international trade. We can learn from the experience of APEC on the main issues to be discussed in such dialogues, which would include the following:

- Customs procedures.
- Container security.
- Paperless trade, single window, and trade facilitation.
- E-commerce:
 - EDI standards; legal, regulatory and policy environments; security (data privacy; consumer protection; cyber security).
- Standards and conformity.
- Intellectual property rights.

2. Approaches to intergovernmental cooperation for promoting international trade

Activities for promoting international trade within the framework of intergovernmental dialogue will be carried out in cyberspace. A portal site will be developed to: (1) provide information and simple data exchange without specified targeted industries and supply/trade chains; and (2) promote exports by a targeted industry, or improve processes within a targeted supply/trade chain.

a) Establishment of portal site

Activities under this approach might be relatively simple. A website will be set up or be linked to other websites as a one-stop information source, in order to provide online services free of charge or at low cost, such as:

- Provision of general information such as statistics.
- Publication of advertisements.
- Directory of firms.
- Registration of business proposals.
- E-learning
- Download of IT tools and software

These will be open to every business to make offers and in some cases accomplish complicated procedures.

b) Target-oriented cooperation for trade promotion

The cooperation that defines the scope of cooperation area will enable firms to carry out electronic data interchange (EDI) and other complicated online procedures, by using dialogues for standardization and establishing IT systems, which should be customized to the objectives in question. Although the contents of the portal site can be almost the same as the general-purpose portal site, they will be more sophisticated in order to work and collaborate with advanced techniques and highly automated methods. There are two main fields for promoting international trade: (i) trade facilitation; and (ii) trade promotion in targeted sectors.

(i) Trade facilitation:

This involves efforts to create efficient and secure trade infrastructure common to all sectors. The main activity areas will be as follows:

- Trade procedures: e-customs, e-sanitary and phyto-sanitary certificates, e-certificate of origin, and single window system for government procedures.
- Trade facilitation: this includes transportation, trade finance and other entities that belong to the trade chain.
- Security

(ii) *Trade Promotion in targeted sectors*

- Non-IT sector: Each country has established industries with comparative advantages that need to be improved continuously. These sectors are one of the fields for IT use, and will become important areas for international cooperation. In the case of Chile, investments and R&D were concentrated in non-IT sectors such as agriculture, so this country will be able to take the initiative in international cooperation to apply IT in those sectors. Chile can collaborate with countries with advanced IT sectors in the field of new IT applications and equipment for primary commodities and their processed products, such as traceability systems and precision agriculture that makes use of satellites, geographic information system (GIS), global positioning system (GPS), sensors, handheld and other IT equipments in farm lands.
- IT sector: This is a relatively new industry, especially in Latin America. Key policy issues will therefore include technology transfer through international cooperation and FDI by multinational IT firms. In the case of Chile, the IT sector does not have strong base of export products and services worldwide, so development of the IT exporting sector will be a medium-term issue. To this end, the country can benefit from technology transfer from Asia and other IT-advanced regions through online collaboration and e-learning. Asian firms will be able to enter the Latin American market by customizing their products and services and establishing sales channels, for which they will need to find local business partners. Chile will become a bridge between the Asian and Latin American IT sectors.

3. Implementation a system of IT-based trade promotion

A well-coordinated implementation system complements international cooperation initiatives. Examples include the following:

- Partnerships between export and investment promotion agencies: these agencies have their own websites that provide information, marketplaces to register business proposals and other services. SMEs that are preparing for international trade can benefit from such services, which are offered by the agencies in their home country as well as in trade partners' and third countries.
- Public-private partnerships (PPP): the public sector, business associations and private firms can cooperate to incorporate policy issues into political dialogues. Business associations will be able to collaborate with the public sector to take measures against them. The private sector can more efficiently develop and operate IT platforms created for intergovernmental cooperation. Moreover, large firms gain benefits from e-commerce with SMEs.
- Knowledge and technology transfer from universities: Universities will play a leading role in developing high value-added industries, because R&D is carried out mainly by academic and governmental institutions. Inter-university networks will strengthen this mechanism.
- Partnerships between aid agencies, and south-south cooperation: a system needs to be established to transfer best practices in new business promotion, and in SME capacity building and IT use. This will be implemented efficiently through south-south cooperation.

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